0942

PIT AND QUARRY

JUNE, 1939

Carbon-Dioxide Recovery . . . Processing Kaolin in Georgia . . . Choosing the Correct Type of Rope . . . From Steam to Electricity to Diesel . . . Sampling for Dust Control

The World's Longest Belt

Inaugurates a new era in low-cost hauling

TODAY at Grand Coulee Dam Goodyear rubber is teaching industry a new lesson in the economical transport of bulk materials. There the longest belt the world has ever seen—a continuous rubber conveyor almost TWO MILES long—can haul 2,000 tons of stone aggregate every hour from the screen house to the dam site nearly a mile away.

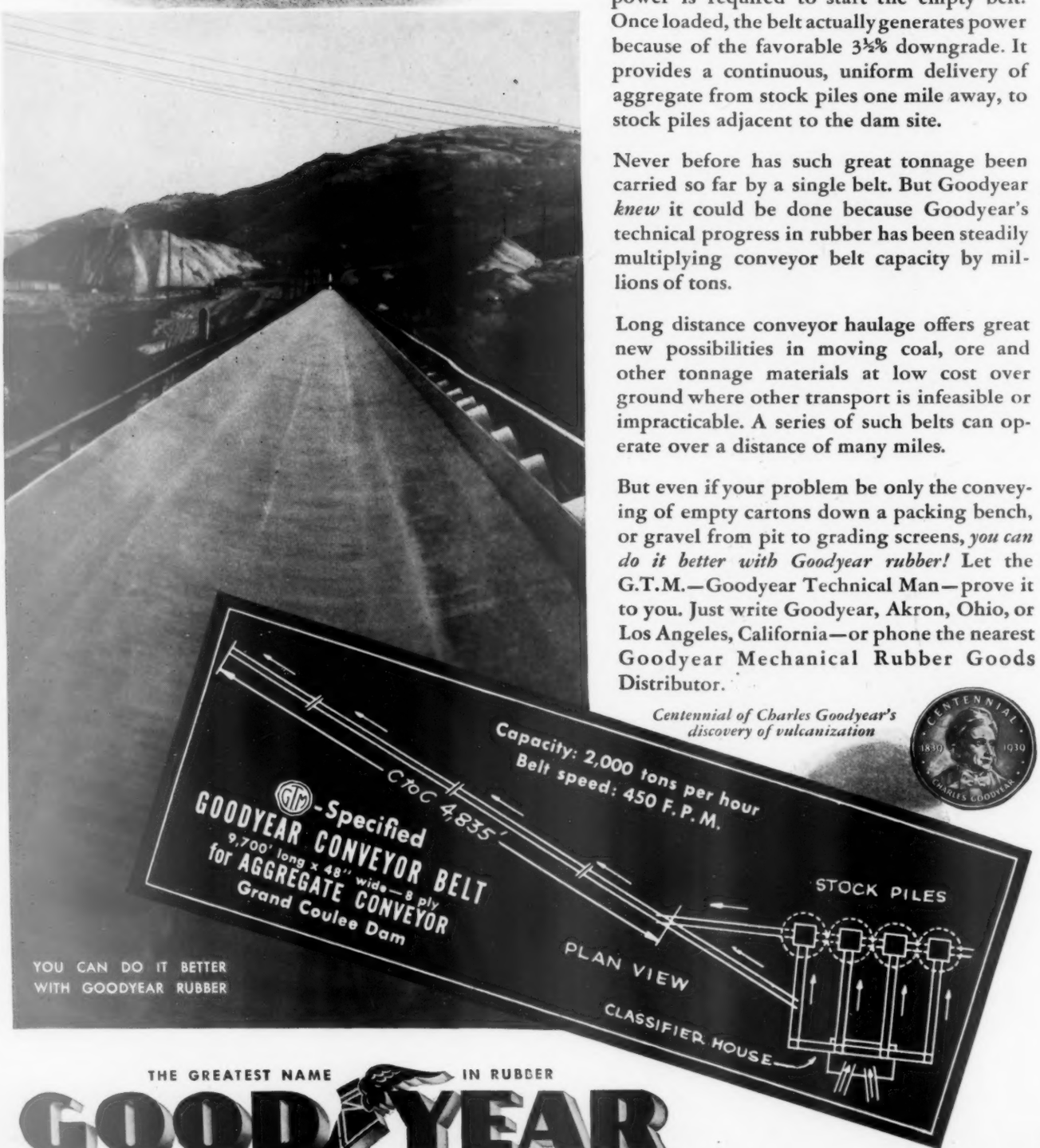
This gigantic conveyor, a single Goodyear belt weighing 80 tons, operates on centers of 4,835 feet. One hundred and twenty-five horsepower is required to start the empty belt. Once loaded, the belt actually generates power because of the favorable 3½% downgrade. It provides a continuous, uniform delivery of aggregate from stock piles one mile away, to stock piles adjacent to the dam site.

Never before has such great tonnage been carried so far by a single belt. But Goodyear *knew* it could be done because Goodyear's technical progress in rubber has been steadily multiplying conveyor belt capacity by millions of tons.

Long distance conveyor haulage offers great new possibilities in moving coal, ore and other tonnage materials at low cost over ground where other transport is infeasible or impracticable. A series of such belts can operate over a distance of many miles.

But even if your problem be only the conveying of empty cartons down a packing bench, or gravel from pit to grading screens, *you can do it better with Goodyear rubber!* Let the G.T.M.—Goodyear Technical Man—prove it to you. Just write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

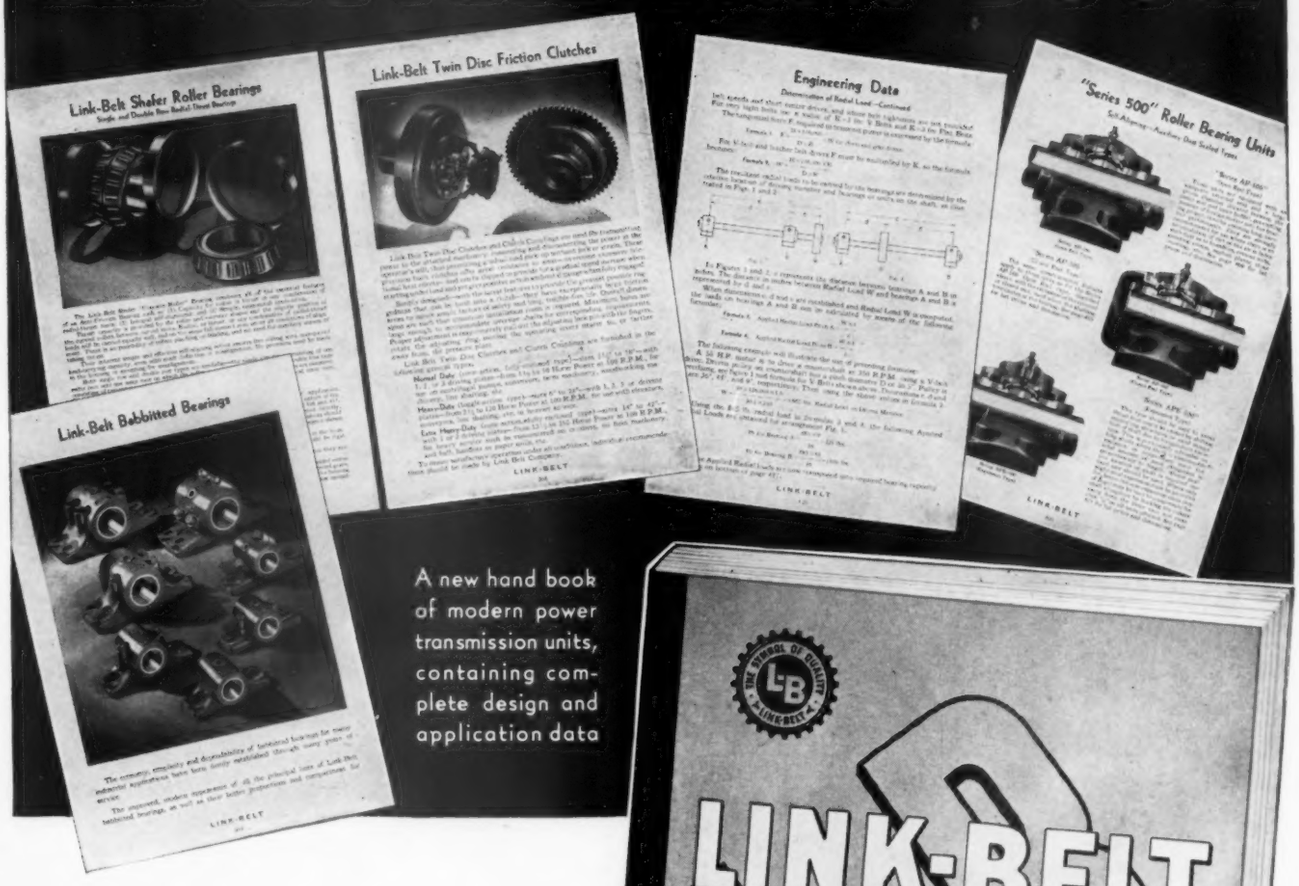
Centennial of Charles Goodyear's discovery of vulcanization



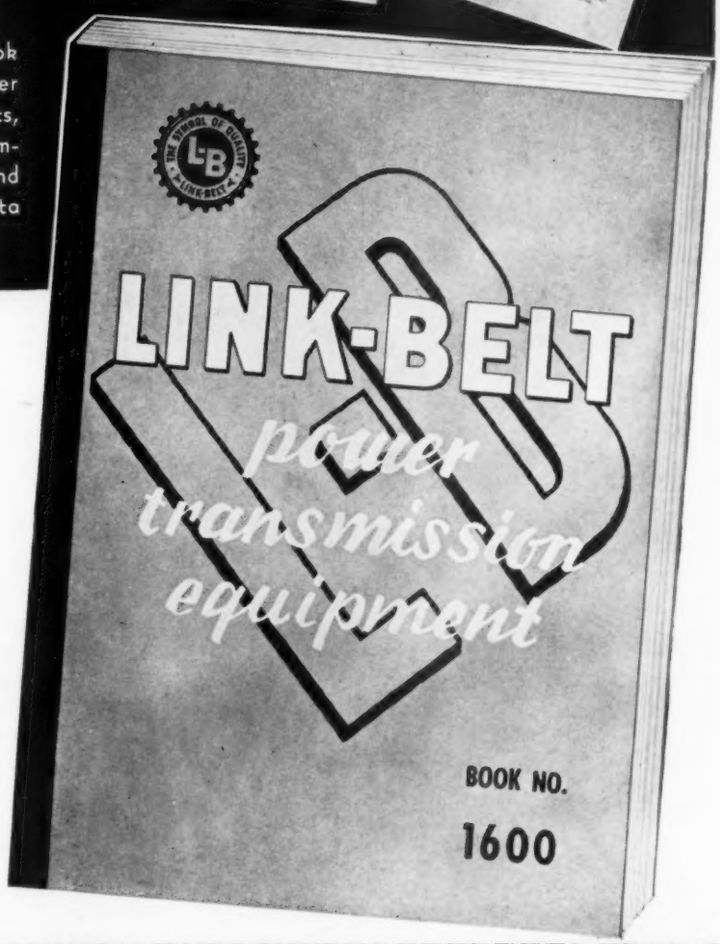
THE GREATEST NAME IN RUBBER

GOODYEAR

SEND FOR THIS NEW 272 PAGE DATA BOOK



A new hand book of modern power transmission units, containing complete design and application data



Between the covers of this new book are presented in convenient, compact form, complete engineering and reference data on—self-aligning anti-friction ball and roller bearing units, newly designed for greater life . . . unmounted bearings for various industrial applications . . . babbitted bearing units for every service . . . welded steel base plates . . . take-ups . . . friction and jaw clutches, including the newly-acquired Twin Disc line . . . Cast and cut tooth gears . . . steel split and cast iron pulleys . . . safety collars . . . couplings, both flexible and rigid . . . drop hangers and hanger bearings . . . grease fittings . . . shafting—the latest designs of the leading manufacturer of power transmission equipment. 272 pages of illustrations, dimensions, weights, list prices, engineering information, cross-indexed for the convenient use of design engineers and plant managers. Return the coupon for your copy.

LINK-BELT COMPANY, 300 W. Pershing Road, Chicago, or 2045 W. Hunting Park Ave., Phildelphia

Please send copy of new Power Transmission Book No. 1600

7770-A
Pit and Quarry

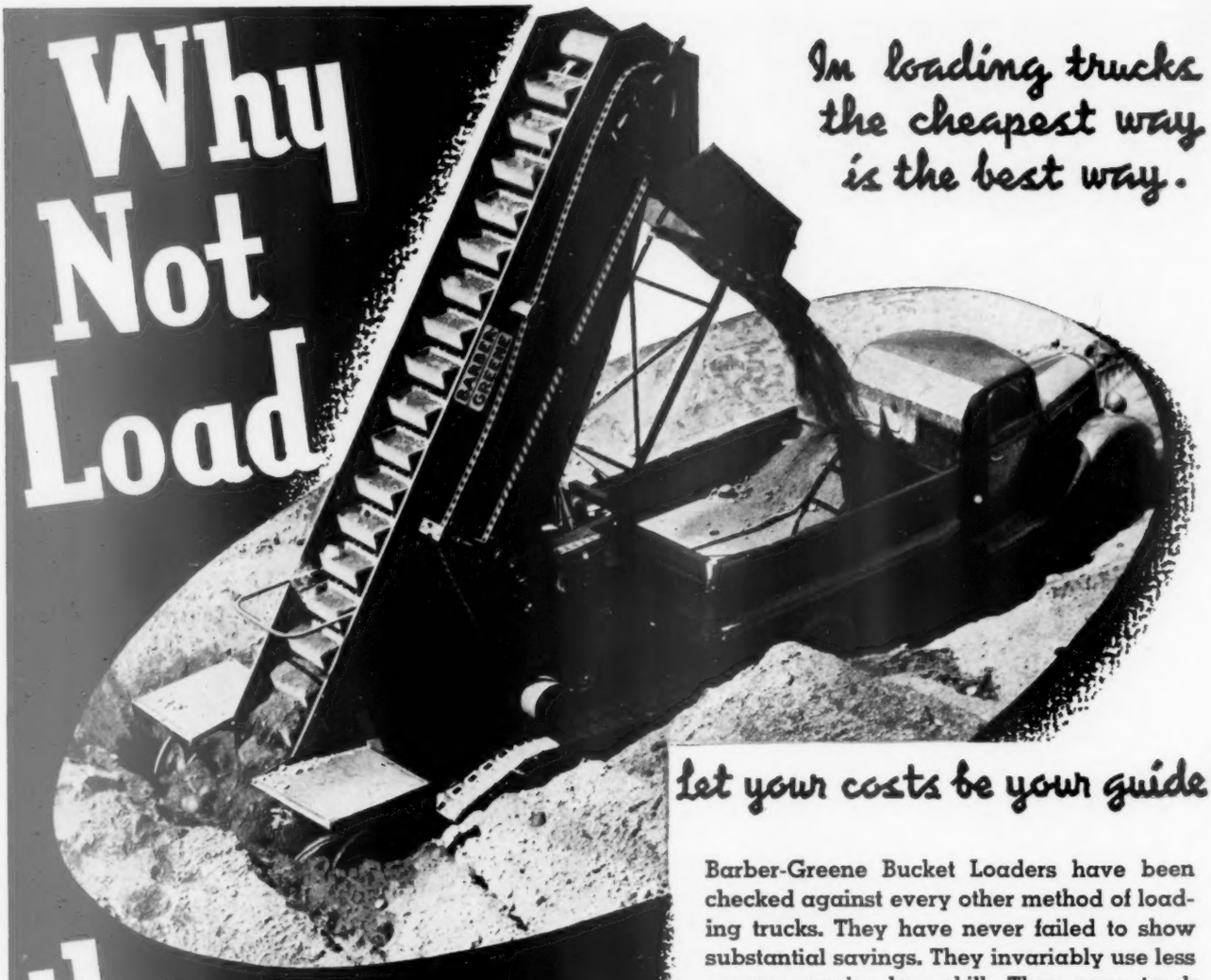
Name_____ Firm_____

Business_____

Address_____ City_____ State_____

PIT AND QUARRY, June, 1939. Vol. 31, No. 12. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

Why Not Load the Cheapest Way?



In loading trucks the cheapest way is the best way.

let your costs be your guide!

Barber-Greene Bucket Loaders have been checked against every other method of loading trucks. They have never failed to show substantial savings. They invariably use less power, require less skill. They save truck time, man time, job time. Their versatility makes them useful the year 'round for all types of loading, stripping, light excavating, and unloading cars. They are available with gravity, shaker or high capacity vibrating screens.

The mechanical design and exclusive features of the Barber-Greene place it way ahead in quality, dependability, and ease of operation.

Write now for full information. There is no obligation.

Barber-Greene Company
Aurora, Illinois

• STANDARDIZED MATERIAL HANDLING MACHINES •

Representatives in Principal Cities

BARBER GREENE

BRANCH OFFICES
Cleveland · Chicago · New York
Columbus · Boston · Detroit · ·
Cable Address · BARGREENE ·

Standardized Belt Conveyors
CARRIERS
Portable CONVEYORS
SNOW LOADERS for high speed removal
Permanent CONVEYORS
and other standardized unit parts
MIXERS for Bituminous or Stabilized Mixing · · · Central or Travel Plant
Leveling-Tamping FINISHERS
LOADERS for lowest cost loading
Vertical Boom DITCHERS
Low Cost-High Quality Road Construction

GILLETTE KILN *thanks* "CARBOFRAX"

Super Refractory largely responsible for success of new kiln

THE Gillette Kiln has made possible the economical treatment of limestone and the efficient recovery of the CO_2 gas formed in the process.

And "Carbofrax", the Carborundum Brand Silicon Carbide super refractory, has been in a large part responsible for the outstanding success of the Gillette Kiln. Heat is transmitted through the retort walls to the charge in sufficient quantity and at a high enough rate to make the operation economically and mechanically successful because "Carbofrax" has the highest heat transfer of any commercial refractory—twelve times that of fireclay.

And retort life averages eighteen months or longer even under the conditions of severe abrasion and high temperatures encountered, because "Carbofrax" has extreme resistance to abrasion and is designed for high temperature operation.

Other successful applications of this remarkable refractory in the lime and cement industry are as eye arches in vertical lime kilns, clinker chutes of rotary cement kilns and lifter blocks in clinker coolers.

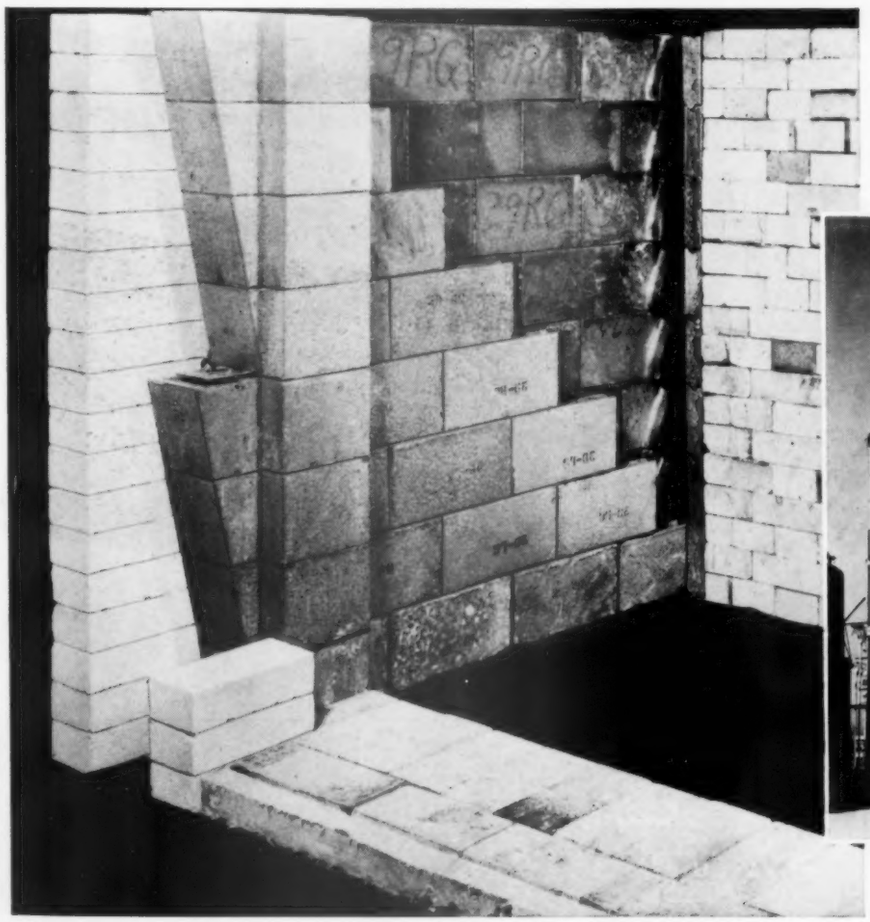
An engineering representative is available for a discussion of your problem. Write the office nearest you.

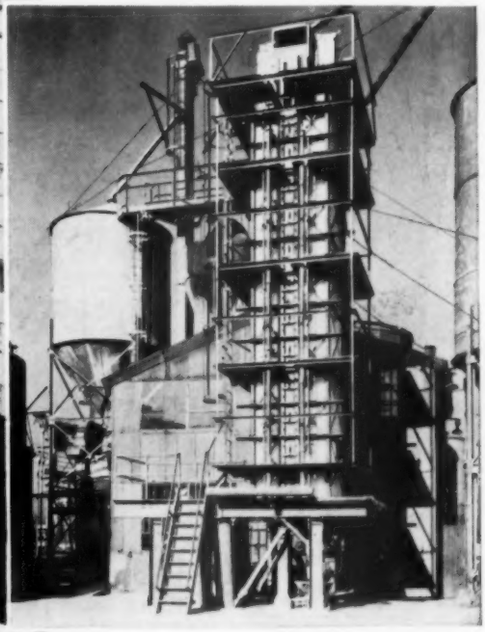
REFRACTORY CARBORUNDUM PRODUCTS

THE CARBORUNDUM COMPANY
REG. U. S. PAT. OFF.
Perth Amboy, N. J.

District Sales Branches: Boston, Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh. Agents: McConnell Sales and Engineering Corp., Birmingham, Ala.; Christy Fire Brick Company, St. Louis; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Co., Los Angeles, San Francisco, Seattle; Denver Fireclay Co., El Paso, Texas.

(Carborundum and Carbofrax are registered trade-marks of The Carborundum Company)





● *At left—model of section of combustion chamber of a Gillette Kiln showing retort built of "Carbofrax" tile.*

Weighs 8½ to 9 tons; Travels 4¼ miles per hour; Steers like a tractor; Power 38 to 56 H.P.; Swings 5 r.p.m.; Hooked Conical Rollers (no center pintle); Twin, positive rope crowd; 28 Ball and Roller Bearings; Automatic Lubrication.

"Quickest and fastest moving machine we ever had,"

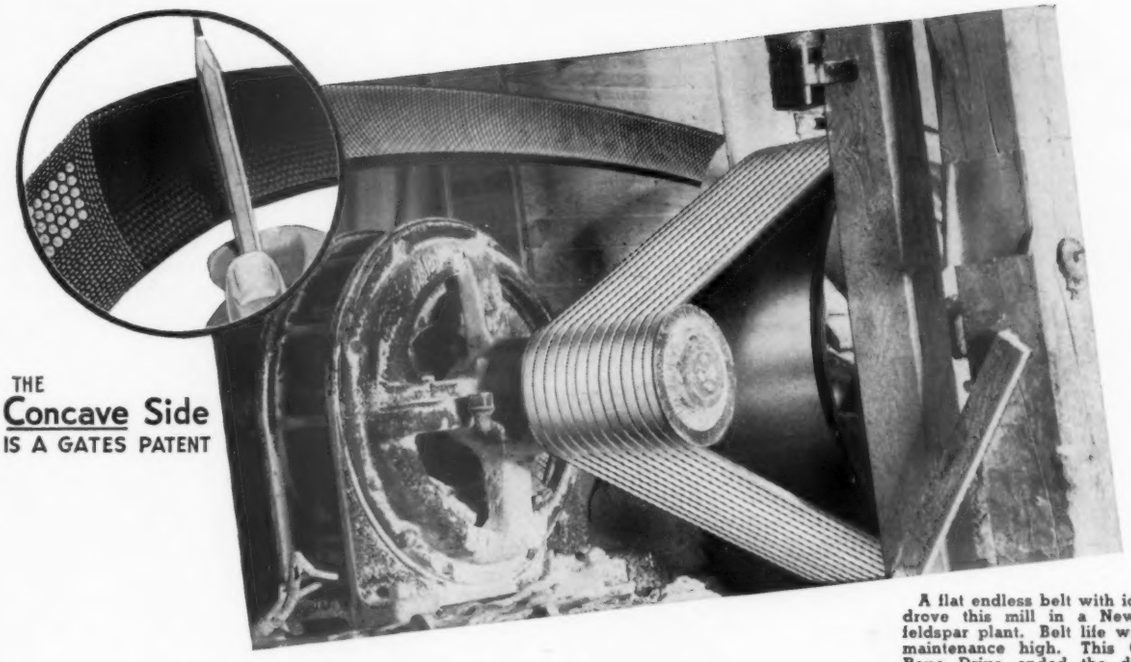
Says Binghamton Crushed Stone & Gravel Corp., Frank J. Boland, Pres.

Using their 10-B shovel to load sand, gravel and crushed stone from their stock piles, Binghamton Crushed Stone and Gravel Corporation average outputs of 60 to 75 yards (actual truck measurement) per hour. They like, says Superintendent McIntosh, the "simplified operation, coordination of all working parts, and Bucyrus-Erie service." You will too — investigate this modern way to bigger profits!

Bucyrus-Erie

BUCYRUS ERIE

SOUTH MILWAUKEE WISCONSIN



THE **Concave** Side
IS A GATES PATENT

A flat endless belt with idler formerly drove this mill in a New Hampshire feldspar plant. Belt life was short and maintenance high. This Gates Vulco Rope Drive ended the difficulty—has paid for itself already.

Just Feel a bending V-BELT

if you want to *Spend Less* for BELTS and POWER

AS a V-belt bends, you can actually *feel* its sides *change shape!* The top of the belt is under tension and grows narrower (see figure 1, at right). The bottom is under pressure—therefore it widens. These stresses force a straight-sided V-belt to *bulge* in the sheave groove (Fig. 1). This causes uneven wear on the belt sides—*shorter life!*

Now look at figure 2. There you see how the concave side of the Gates Vulco Rope (U. S. Patent 1,400,539) exactly corrects this bulging. It insures a perfect fit in the sheave groove with *uniform* side-wall wear and, therefore, *longer life!* It insures that the *entire* side-wall grips the pulley—heavier loads are carried without slippage—belts are *saved* and power consumption *reduced!*

The Gates Vulco Rope is the only V-belt built with the patented concave side.

What Happens When a V-Belt Bends

FIG. 1

FIG. 2

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 741 Warehouse St.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 1231 N. W. Hoyt St. SAN FRANCISCO, CAL., 2700 16th St.

Thrills

...for you and your family at the New York World's Fair!

WHEN YOU COME—BE SURE TO VISIT THE ROEBLING EXHIBIT!

©N.Y.W.F.

"THIS WILL INTEREST YOU, JOHNNY . . . a whole village in miniature. See, there's a school, a church, a fire house, some stores—even a water tower and a railroad station. And look . . . here comes the train!"

"THAT, MY DEAR, is the world's largest dredge, the Crest. I've seen her—and this replica sure looks natural. Why, it's identical with the original, down to the last boom line and hoisting rope!"

TO YOU and your family . . . a hearty invitation to visit the Roebling Exhibit at the New York World's Fair!

No matter what your business activity . . . engineering, contracting, mining, railroading, manufacturing, building management or what-not . . . you will find that this Roebling Exhibit is designed specifically to interest *you*—to help make *your* visit instructive and keenly enjoyable.

Action every moment! Mining, construction, dredging and other industrial operations in full swing! All in miniature . . . with excavating, hoisting, and conveying equipment incredibly exact in detail. Even the tiny wire ropes and cables are exact duplicates of their full-size counterparts!

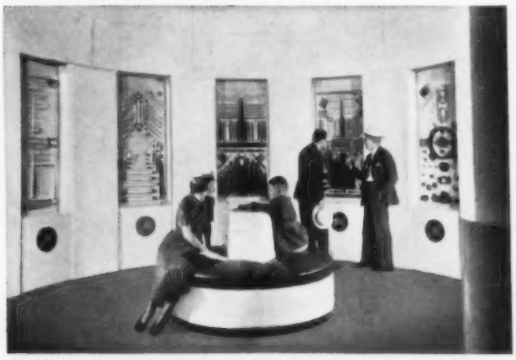
So come . . . you and your family. We will give you a royal welcome. And remember . . . we are in the Metals Building, directly in front of the Trylon and Perisphere.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J., *Branches in Principal Cities.*

ROEBLING

WIRE ROPE & FITTINGS • ELECTRIC WIRE & CABLE • FLAT WIRE • WOVEN WIRE FABRICS • WELDING WIRE • OTHER WIRES & WIRE PRODUCTS

"I WANT YOU TO SEE THIS, JACK. It's that Roebling Passenger Tramway I was talking to you about. Somebody used his head when he put in these blueprints so engineers can study the construction details."



"WHILE MARY AND JOHNNY ARE RESTING, suppose you and I look over this interesting exhibit of Roebling Products. There are more of them in the other rotunda, at the opposite end of the exhibit."

"NOW, HERE'S SOMETHING! This wire rope is 5½ inches in diameter! I'm told it is one of the largest wire ropes ever made by machine—and it surely looks the part."

THE METALS BUILDING is easy to locate and quick to reach. It is situated directly in front of the Trylon and Perisphere—the theme center of the New York World's Fair.

"Give me TIMKEN ROCK BITS EVERY TIME" Says THE EXPERIENCED DRILLER

Drillers can speak with authority on the subject of rock bits. The combination of Timken Bit design, faster drilling and greater endurance enables them to do more work in a given time—and to do it with less effort. They do not have to handle so many steels during the shift; have less trouble with plugged steels; and get cleaner, more uniform holes.

It takes specialized metallurgical knowledge and a high degree of steel-making skill to produce the material that gives TIMKEN Rock Bits their superior speed, strength and endurance. Every pound of the steel from which TIMKEN Bits are made is produced in our own steel plant under the immediate supervision of our metallurgists and rock bit engineers.

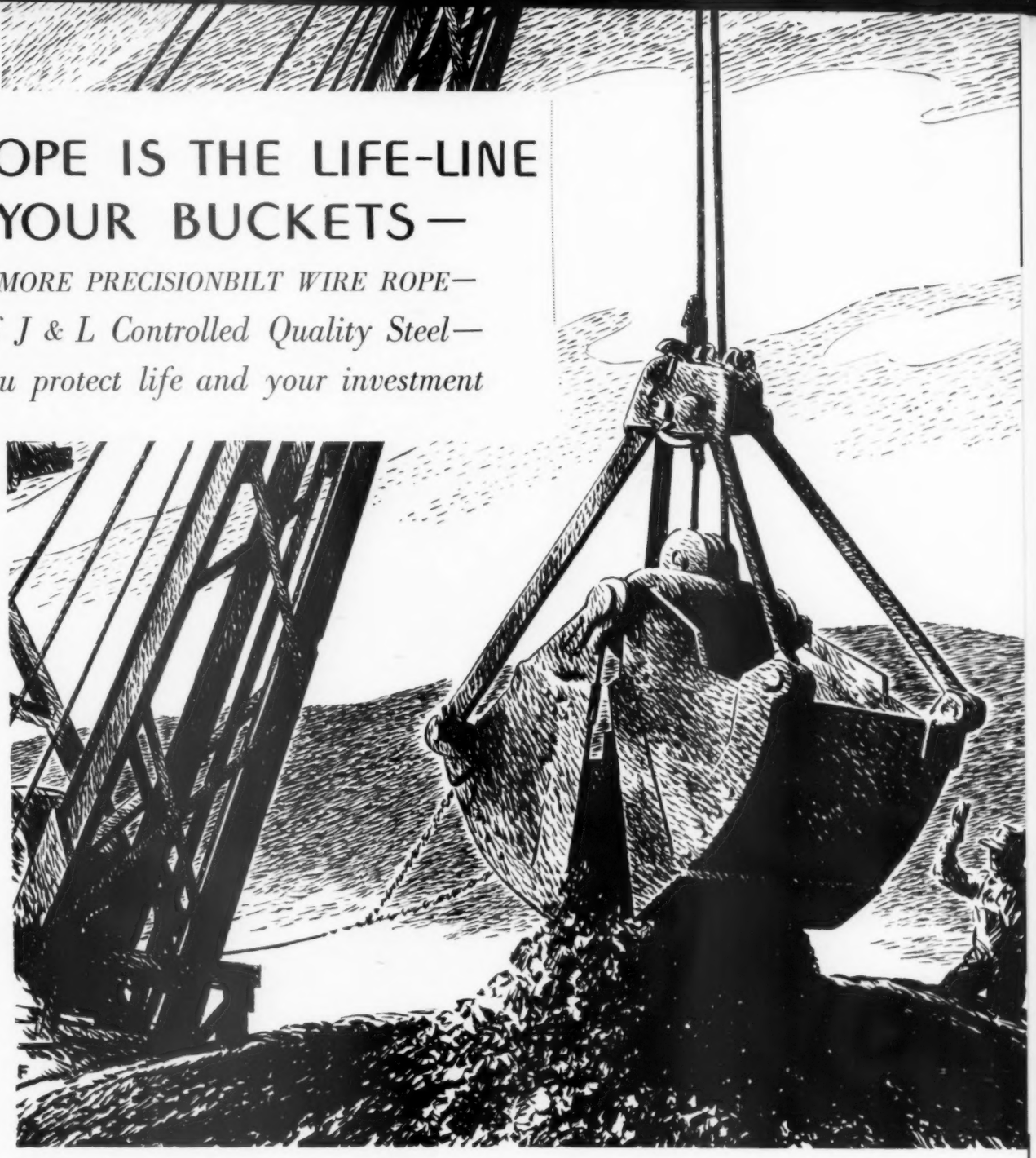
Millions of TIMKEN Bits are now in use in mines, quarries and on big construction projects. Wherever they are used drilling costs are lower than ever before.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
ROCK BITS

WIRE ROPE IS THE LIFE-LINE ON YOUR BUCKETS—

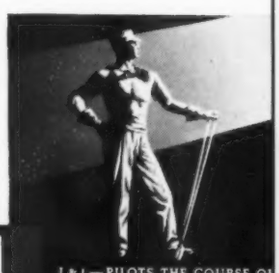
and GILMORE PRECISIONBILT WIRE ROPE— made of J & L Controlled Quality Steel— helps you protect life and your investment



Good wire rope is good insurance against costly breakdowns, delays and injuries. And good rope — rope that lasts and gives long, safe, economical service — must be formed with precision from wire drawn from the finest steel.

In Gilmore Precisionbilt Wire Rope — made from J & L Controlled Quality Steel — you get this combination of security and service. For the quality of J & L Steel is controlled from the grading of the iron ores to the drawing of the steel wire. And this quality-controlled wire is formed into Gilmore Rope on the latest type of machines — in the country's most modern wire-rope plant — by skilled men who work with the knowledge that sometime in the life of every rope they make, human life may depend upon its performance.

There is a Gilmore Precisionbilt Wire Rope for every contracting and mining need. Write today for our catalogue — describing the full range of ropes we make for the contracting and mining industry.



JONES & LAUGHLIN STEEL CORPORATION

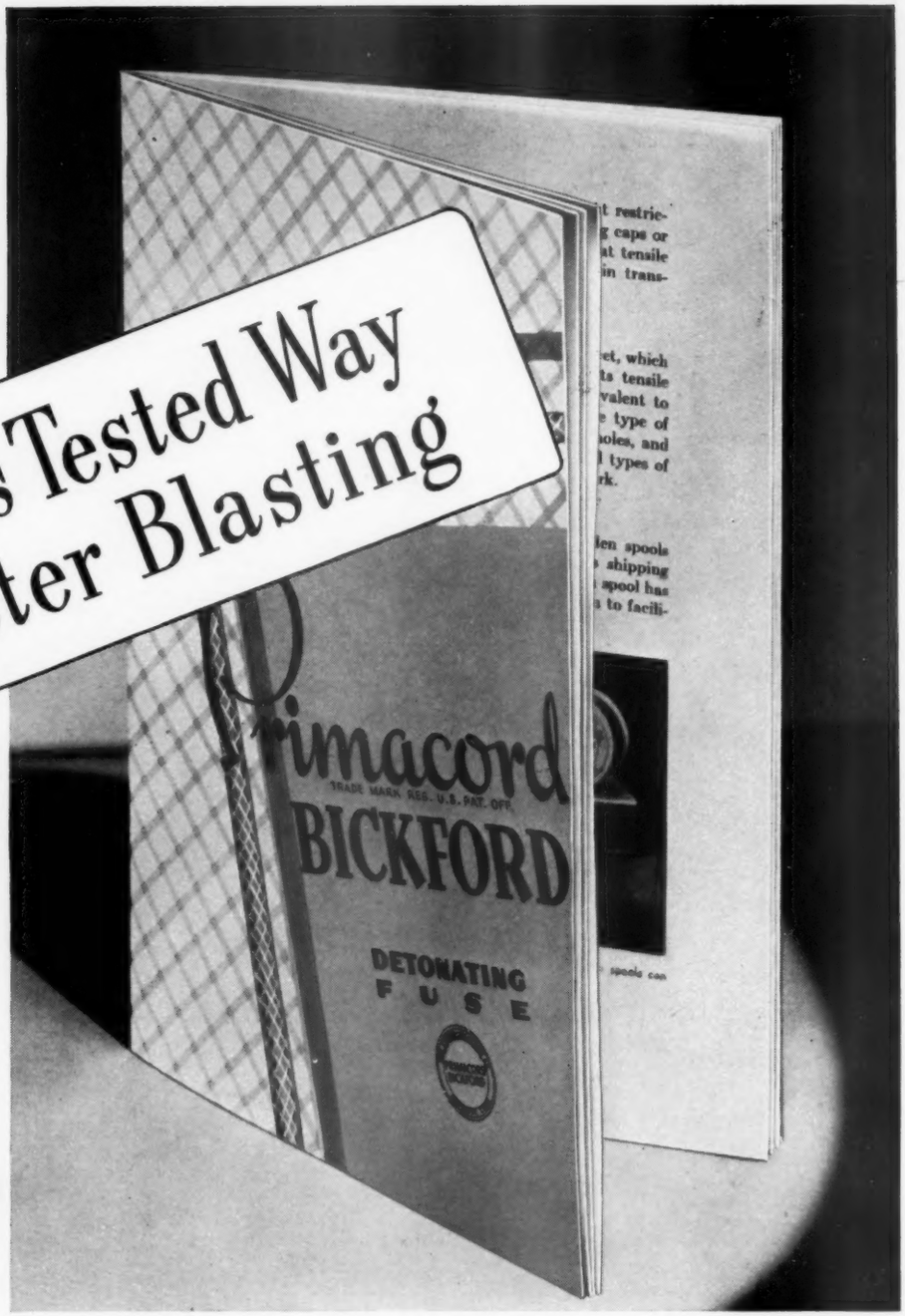
GILMORE WIRE ROPE DIVISION

MUNCY, PENNSYLVANIA

J&L STEEL

J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY

Use this Tested Way to Better Blasting



Primacord is *performance-proved*—tried and tested on all sorts of blasting jobs and found successful in every way. This insensitive high-velocity detonating fuse, with a core of PETN in a waterproof textile covering, is tough, flexible, easy to handle and amazingly effective. It saves time in loading and connecting up holes—develops more work from explosives. Use Primacord to reduce costs, get better results and safeguard your profits.

Be sure to get your copy of the Primacord-Bickford Booklet, which gives complete information on this improved detonating fuse.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONN., U.S.A.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse Since 1836

PRIMACORD·BICKFORD *Detonating Fuse*

PB9

You know in advance HOW CHALLENGER BELTING WILL DO THE JOB

REPUBLIC ASSURES LONG SERVICE BY THOROUGH PRE-TESTING

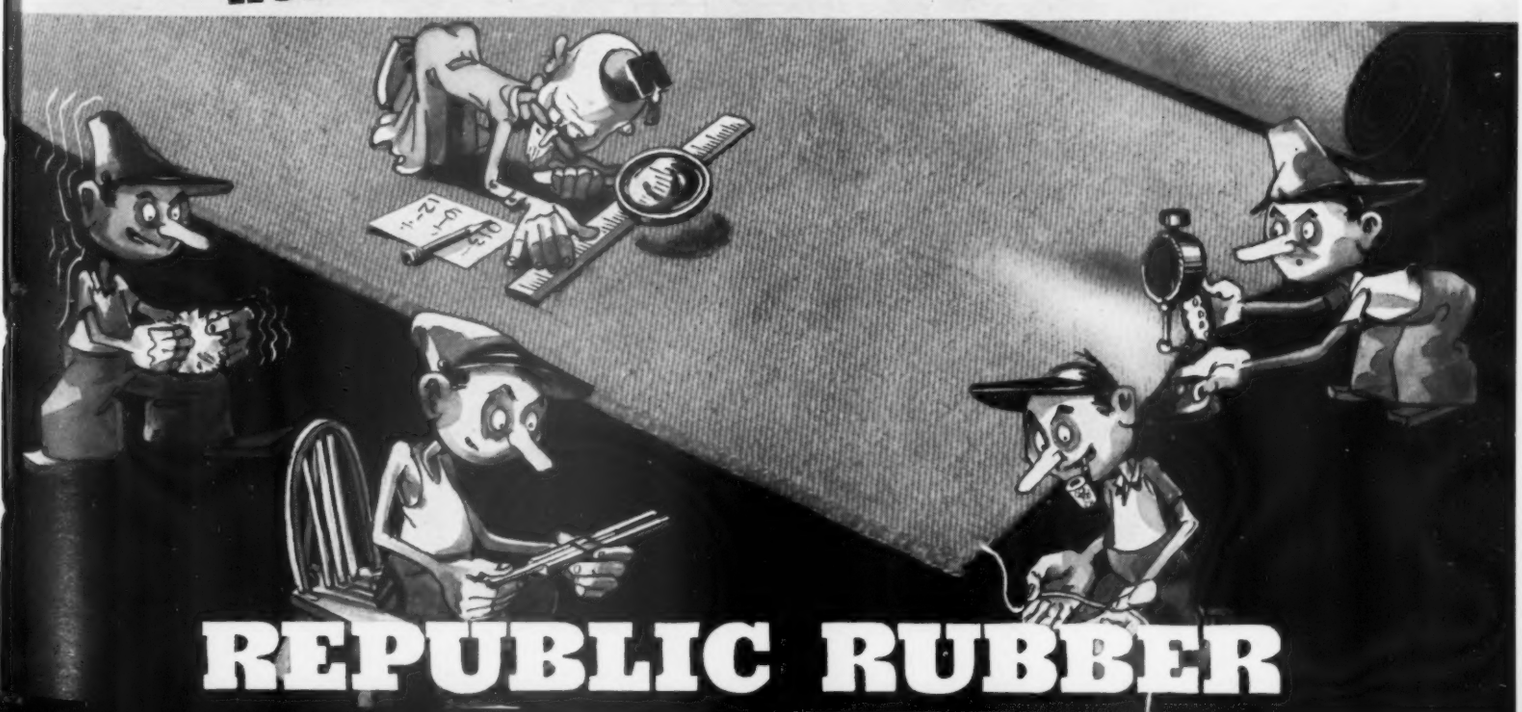
● Among the many products in each class of modern industrial equipment, there are certain trade names which represent positive assurance of consistent quality to their users. To achieve and hold such a reputation and confidence for his products requires high standards and painstaking procedure on the part of a manufacturer. This explains the rigidly controlled manufacture of Republic Challenger Belting and justifies the confidence of the countless firms who rely on it for dependable performance . . . .

Every run of Challenger Belting is scientifically pre-tested . . . and checked for serviceability . . . before leaving the factory. The duck must be constructed to resist shock loads and internal chafing. Fatigue resistance of friction between plies is determined by testing flexing cycles under specified load and speed. Further, the rubber compound used for impregnating of duck has a high coefficient of friction. After such analysis of component parts, the finished belt is completely tested to rigid factory standards of strength, resiliency and resistance to stretch. To know in advance how well your belting needs will be filled, state your preference for Republic's Challenger . . . . . .

Evidences of this scientifically supervised manufacture are also found in Republic Hose, Packing and Molded Rubber Goods—as well as other grades of Transmission Belting. Republic Rubber Division of Lee Rubber and Tire Corp., Youngstown, Ohio.

ORDER REPUBLIC RUBBER PRODUCTS
FROM YOUR DISTRIBUTOR

HOSE·BELTING·PACKING·MOLDED PRODUCTS



REPUBLIC RUBBER

Readers and Advertisers Alike Prefer PIT AND QUARRY

For nearly a decade Pit and Quarry has led the field in subscriptions among producers. Its popularity has grown constantly, its margin of lead increased steadily, not by any sudden bound due to special offers or inducements. Its volume of advertising in 1938 was definitely larger than that of any other paper in the field.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked with them. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working with them.

The subscription price is still only one dollar for a full year's service. If you are not already a subscriber, why not send in a dollar and learn why other producers find Pit and Quarry so valuable? The cost is small—the results so large—don't delay.

Return This Coupon To-day—Start Your Subscription with the June issue

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for.....
1 year ($1.00).....starting with the June issue. (Foreign add $1.00 per year.)

My Name..... Title.....

Company Name .....

Send to (Address).....

We Produce.....

Swintek LADDERS ARE PAYING BIG DIVIDENDS

2 — HUGE LADDER ORDERS IN APRIL

RIVER SAND CO., OWENSBORO, KY.
60 FT. LADDER, 10 IN. PIPE LINE

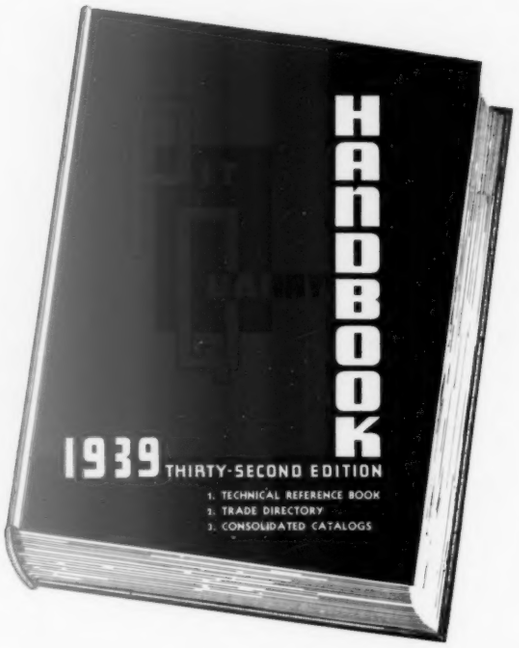
LOUISVILLE SAND & GRAVEL CO., LOUISVILLE, KY.
70 FT. LADDER, 15 IN. PIPE LINE

LET US MAKE DIVIDENDS FOR YOU

INVESTIGATE!

CONSULT US ABOUT YOUR
WASHING PROBLEMS

EAGLE IRON WORKS
DES MOINES, IOWA, U. S. A.



ACQUIRE THIS NEW UP-TO-DATE MAILING LIST

. . Order Your Copy Now!

. . . . Alphabetical, by Company Names →

. . . . Geographical, by Plant Location →

Hundreds of New Names . . . Others Checked and Revised

The 1939 Directory section of Pit and Quarry HANDBOOK is the most complete ever published. It is up to the minute—as modern as skill and money can make it. It's checked and double checked. Copies are now available.

It gives you the names of the companies, their officers, the number and locations of plants, their capacities and equipment, and the names of the men who buy.

The technical section gives the latest production methods and practices. And there are consolidated catalogs of equipment.

The new and 32nd edition will be of greatest benefit to those who order promptly and receive their copy immediately. Use coupon below. Select either the complete Handbook and Directory, or the convenient Directory alone in smaller, flexible binding, more convenient for salesmen. The price is the same in either case.

Don't Waste Your Time and Postage on an Old List

Pit and Quarry, Date.....

538 S. Clark St., Chicago, Ill.

Please send.....copies of the 1939 HANDBOOK ($10.00 per copy) ☐ Check enclosed.....

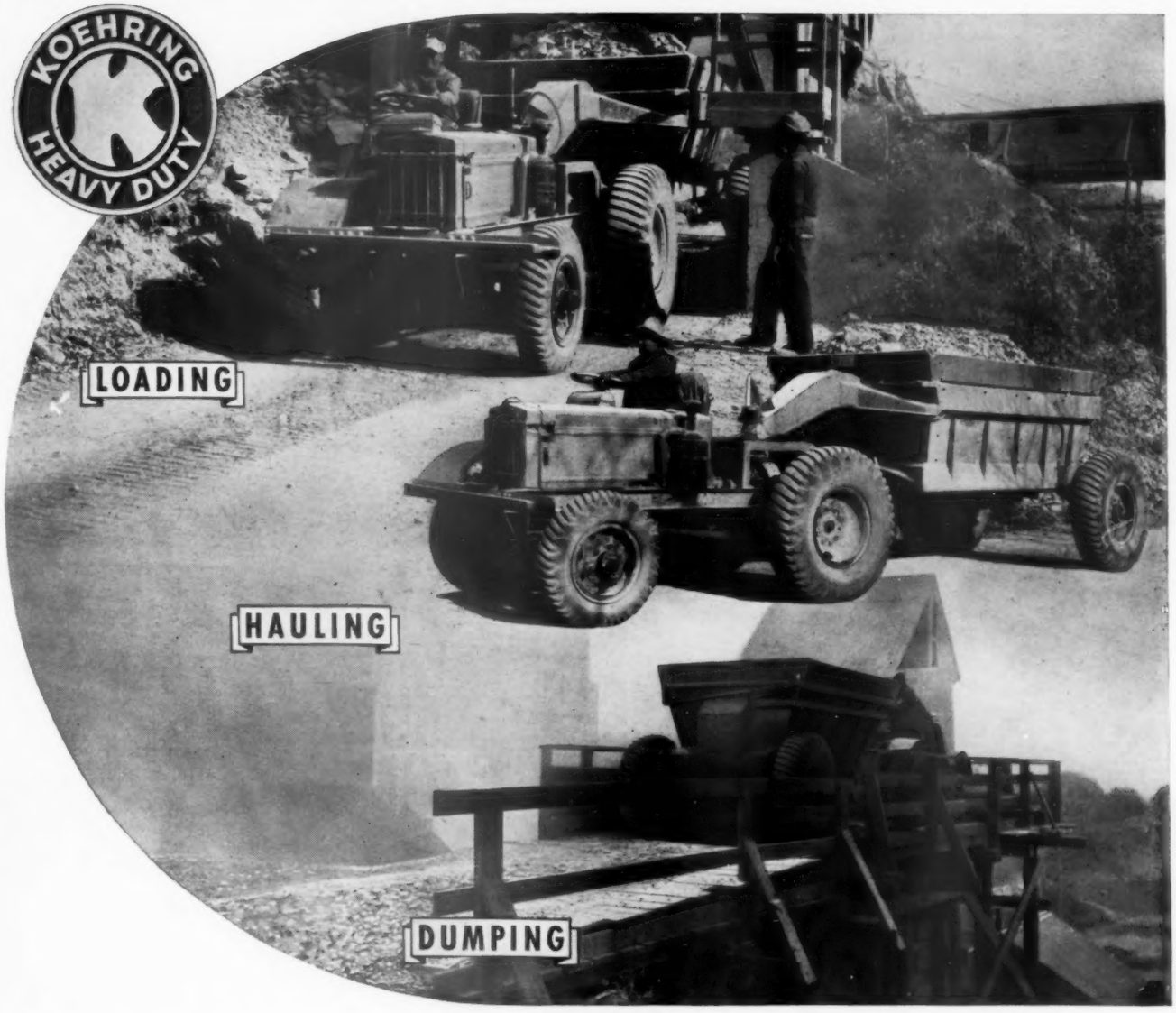
Please send.....copies of the 1939 DIRECTORY ($10.00 per copy) ☐ Send Invoice with book

Name ..... Title.....

Company .....

Town ..... State .....

KOEHRING



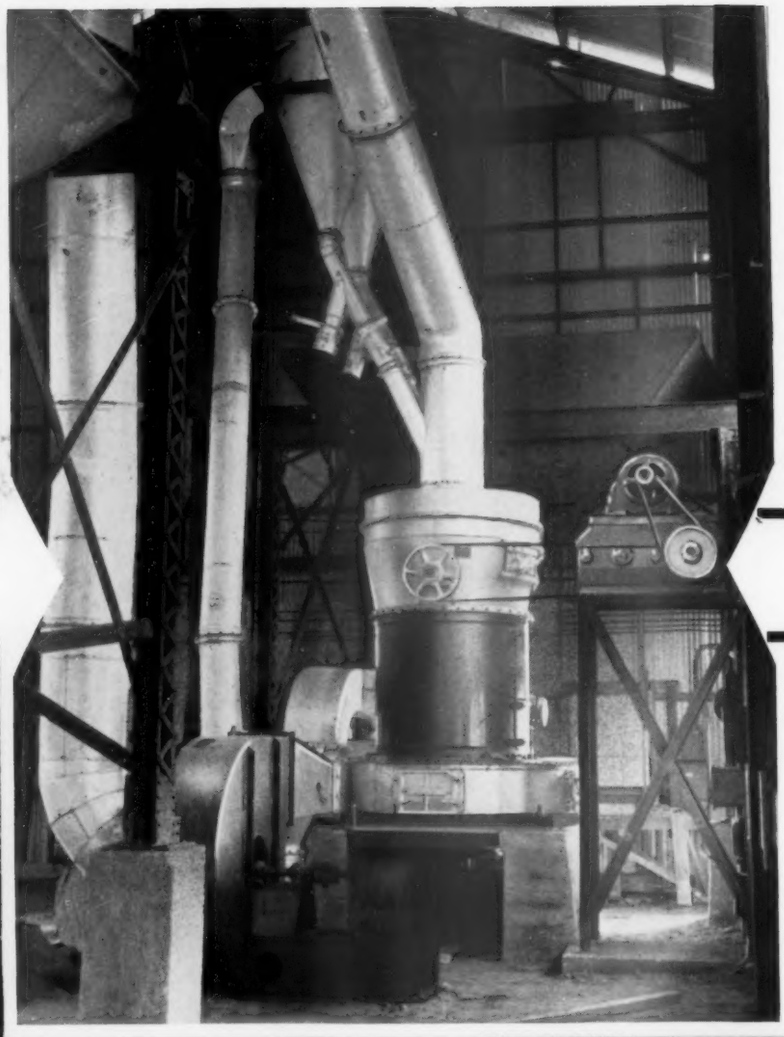
Quarry Hauling Costs Are Reduced!

Three Trail-Dumps replaced five to six other units in this quarry transportation problem. Ten tons for every load, high speed travel from primary to secondary crusher and instantaneous dumping at the second crusher, reduced hauling time, increased capacity for each trip, and reduced dumping time. Lower investment, lower maintenance, increased production, are three important factors responsible for substantial reduction in hauling costs on this job.

KOEHRING COMPANY, *Milwaukee, Wis.*

HEAVY-DUTY CONSTRUCTION EQUIPMENT

DRYING SYSTEM



WHIZZER SEPARATOR

New METHOD OF *Finish Drying* AND *Grinding* SPECIAL CLAY

Latest Type . . .
RAYMOND ROLLER MILL

THIS Raymond installation shows how a difficult clay handling job is simplified by the use of a whizzer-equipped Roller Kiln Mill with a drying system. This modern unit combines the drying, pulverizing and classifying of the product into one continuous, dustless operation.

The crude material comes to the mill pre-dried to a maximum of 15% moisture. It is ground to a fineness of 95% through 200-mesh and the moisture content reduced to less than 6% at a capacity of 8000 to 9000 pounds per hour of dried clay. Hot gases are supplied to the system by an oil-burning furnace. A variable speed transmission on the whizzer drive gives close control over the fineness.

This economical method is also applied to many other operations, such as calcining gypsum, drying and grinding limestone, diatomaceous earth, bauxite and similar non-metallic minerals.

Write for detailed information on drying-grinding methods

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

PIT AND QUARRY

Vol. 31 June, 1939 No. 12

CONTENTS

News of the Industry 19
Editorial: Bad Neighbors 24
Improves Recovery of Carbon Dioxide 26
Performance Measurement and Mechanical Control—III 29
Scalping and Crushing Handled by Portable Plant in This Pit 31
Some Trucking Employees Not Exempt from Hour Provisions 34
Choosing the Correct Type of Rope 35
From Steam to Electricity to Diesel 37
Basic Problems of National Economy 39
Vermont Asbestos Adds Improvements 42
Gain in Phosphate-Rock Production Predicted for Next Ten Years 44
North Carolina Aggregates Producer Thoroughly "Sold" on Diesel Power 46
Survey Indicates Use of Automatic Control Is Rapidly Increasing 49
A Modern Kaolin Plant in Georgia 51
What the State Legislatures Accomplished During May 53
What Size Sheave? 54
Routine Sampling for Control of Atmospheric Impurities 56
Blocks Handled Rapidly and at Low Cost with Gasoline-Powered Unit 68
Automatic Control, Electric Heating Featured in New Bituminizing Plant 70
Portable Concrete-Mixing Plant Adaptable to Varied Service 73

Personal Mention 57
Occupational Diseases and the Law 58
Traffic News Digest 60
Foreign Developments 62
New Machinery and Supplies 62

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Copyrighted 1939 by Complete Service Publishing Co., 538 South Clark Street, Chicago, Ill.

H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Contributing Editors:
WILLIAM C. RIETH
W. R. CLIFFE

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. WILSON
Room 430, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

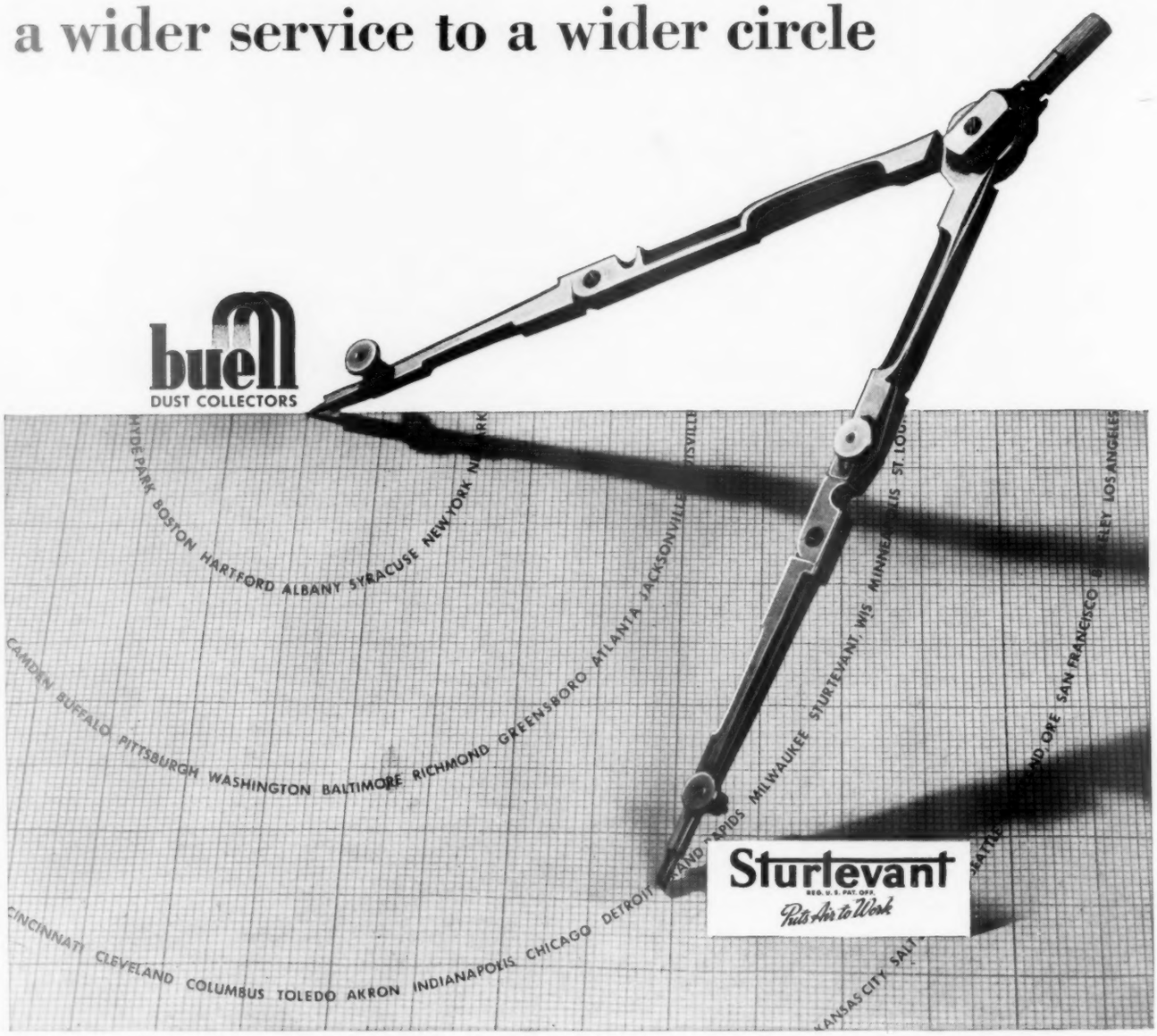
Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 4432
Cleveland, O.

Advertising Representative:
D. R. EGBERT
Chicago, Ill.

Field Representatives:
A. C. PETERSEN
J. K. GARESCHE

MEMBER AUDIT BUREAU OF CIRCULATIONS

Now STURTEVANT and BUELL bring a wider service to a wider circle


buell
DUST COLLECTORS
HYDE PARK BOSTON HARTFORD ALBANY SYRACUSE NEW YORK
CAMDEN BUFFALO PITTSBURGH WASHINGTON BALTIMORE RICHMOND GREENSBORO ATLANTA JACKSONVILLE
CINCINNATI CLEVELAND COLUMBUS TOLEDO AKRON INDIANAPOLIS CHICAGO DETROIT
MILWAUKEE STURTEVANT, WIS
Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

When H. Van Tongeren worked out in Holland those principles of advanced aerodynamic design which are associated with his name and applied them to dust collection, the efficiency of the cyclone was markedly increased, the range of its usefulness greatly widened.

When the Buell Engineering Company, sole American licensee under the Van Tongeren patents, made the new type of cyclone available to the industries of this country, the circle of users quickly widened and the need for a wider field service became apparent.

Today that need is met. The B. F. Sturtevant Company is now complementing Buell's own service through the 40 Sturtevant offices—complementing, too, the Buell Dust and Fly Ash Collectors with Sturtevant's many types of related equipment.

No matter where you are located you can now be sure to find, close at hand, a coordinated service rendered by engineers who are thoroughly qualified not only to discuss with you your dust collection and fly ash problems, but also to aid you in the selection of any necessary fan equipment.

THE ONLY CYCLONES WITH A DUST POCKET • MORE THAN 1100 IN USE

FOR INFORMATION on dust collection ask us for *Bulletin D81*; on fly ash, for *Booklet A93*. Either, or both, will be sent free to any managing executive or operating engineer.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS. ✣ BUELL ENGINEERING COMPANY, INC., SUITE 5000, 12 CEDAR STREET, NEW YORK

New Cement Plant on West Coast Planned

TO SUPPLY SHASTA DAM NEEDS

Pacific Coast cement plants, which, in California, operated at about 46 per cent. of capacity last year and in the Pacific Northwest at about 40 per cent., stand to be materially affected in their operations over the next two or three years by the two major government jobs in their territory—Grand Coulee and Shasta dams. While the California part of this demand is still nearly a year distant, it is in full swing in the Northwest and will so continue through next year.

It is estimated that the two dams from now to completion will require contracts over and above those already in effect covering well upwards of 10,000,000 bbl. of cement. This volume may be contrasted with the fact that the California, Oregon and Washington mills last year produced only about 13,500,000 bbl. If the expected contracts are spread over a 3-yr. period, they would represent an increase of nearly 25 per cent. on the 1938 operating levels, taking all mills into consideration. Actually, of course, not all mills are regarded as in economic reach of the jobs.

Shasta Dam is about 600 mi. north of Los Angeles, and although federal shipments at land-grant load rates will be economical, the question of whether Southern California mills will attempt to compete with northern mills can not yet be answered, although it is known that study of the subject has been under way.

Apparent low bidder on the full 5,800,000 bbl. for Shasta Dam was the Permanente Cement Co., headed by Henry J. Kaiser, well-known San Francisco producer, who announced that the company plans to go ahead with the construction of a new cement plant at Los Altos, Cal. Permit for the plant has been granted and the contract for its erection is reported to have been let to the San Francisco construction firm of McDonald & Kahn. It will cost a reported $4,000,000 and have a daily production capacity of 7,000 bbl.

The Permanente company's bid on the entire requirements was reported to be $1.19 per bbl. The Beaver Portland Cement Co., acting for a group of six companies, bid $1.46 per bbl. Other companies in the Beaver group included the Calaveras Cement Co., the Monolith Portland Cement Co., the Pacific Portland Cement Co., the Santa Cruz Portland Cement Co. and the Yosemite Portland Cement Co.

The Riverside Cement Co., Crestmore, Cal., bid $1.07 per bbl. for 610,000 bbl., part of the estimated 1,400,000 bbl. needed the first year. The California Portland Cement Co., Colton, Cal., bid $1.14 for 500,000 bbl. to be delivered the first year.

Three screens and a new secondary crusher are being installed by the Mid-West Rock Products Co. at its Ridgeville, Ind., plant as part of a $20,000 improvement program.

The work is being done under the direction of Superintendent S. R. Hohe.

Coming Events

June 1, 2, 1939—Hot Springs, Va. Twenty-first annual convention, National Lime Assn., Homestead Hotel.

July 20, 1939—Rye, N. Y. Mid-summer meeting, Board of Directors, National Crushed Stone Assn., Westchester Country Club.

July 27 and 28, 1939—San Francisco, Cal. Mid-summer meeting, Board of Directors, National Sand & Gravel Assn., Palace Hotel.

October 16-20, 1939—Atlantic City, N. J. National Safety Congress and Exposition.

June 26-30 Dates of A.S.T.M. Meeting

CONVENE AT ATLANTIC CITY

The forty-second annual meeting of the American Society for Testing Materials is to be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 26 to June 30.

Two sessions will be devoted to reports and papers on cement, concrete and concrete aggregates, including the Reports of Committees "C-1 on Cement" and "C-9 on Concrete and Concrete Aggregates," the latter including four appended papers dealing with important phases of the committee's work as follows: (1) method of measuring passage of water through concrete; (2) observations of water permeability of concrete; (3) procedures for testing aggregate soundness by magnesium sulphate; (4) and statistical analysis of compression tests on mortar cylinders, cubes and prisms.

Of the eight formal papers in addition two cover specific surface and particle size distribution of cement and the measure of particle size by physical means. Others involve the measurement of thermal volume changes and elasticity of aggregates, a drip method for testing the relative resistance of concrete exposed to weak acids, and a condition survey of 1100 mi. of concrete pavement. Others involve effects of variations in method upon results of freezing and thawing of mortars, the effect of Biot's modulus on transient thermal stresses in concrete cylinders, and a study of effect of cement content and fineness on strength, durability and volume change.

Starts Operations at Pozzuolanic Plant

The Pussolanic Materials Corp., Navasota, Tex., has started production in its $50,000 plant, using a 20-ton tube mill to grind "Pussolan," a pozzuolanic product.

Masonry-Cement Firm Is Target of FTC

MISREPRESENTATION IS CHARGED

The Hy-Test Cement Co., Philadelphia, Pa., distributor of masonry cement, is charged in a complaint issued by the Federal Trade Commission with misrepresentation in the circulation of a booklet purporting to be an official publication of the National Bureau of Standards of the Department of Commerce.

The complaint also involves violation of the rules and instructions of the Bureau of Standards forbidding distribution for advertising or promotional purposes by manufacturers of the results of tests of their products by the Bureau.

The complaint charges that the respondent has caused to be published and circulated a booklet entitled *Bricklaying to Avoid Leaks,* which in fact is an altered reprint of an article written by an executive of the Bureau, in such a manner as to imply that it is an official report of the Bureau.

It is alleged that the booklet also contains information as to tests of the respondent's products by the Bureau of Standards, identifying the products in violation of the rules of the Bureau and of the public policy of the United States.

Vermiculite Mining in Wyoming on Increase

Mining and processing equipment valued at $25,000 have been put in service by the Black Hills Mining & Industrial Assn. to develop its vermiculite properties in the Mormon Canyon area near Glenrock, Wyo.

L. G. Anderson, secretary-treasurer of the association, has moved his offices from Rapid City, S. D., to Casper, Wyo., to be close to the Wyoming development. Associated with him in the Casper office is J. L. Felix.

The association's program for this year includes the establishment of a refining plant and marketing facilities in Casper.

Campaign Renewed on Blasting-Cap Dangers

Renewed efforts are now being made in all parts of the country to lessen the number of accidents occasioned by children playing with blasting caps.

These accidents often result in children being blinded, or losing fingers or hands, and thus going through life in a crippled condition. In some cases children are killed.

Most of these accidents occur in country districts where children find caps in the neighborhood of blasting operations, where, in many cases, they have been left by careless workmen. Playing with these caps—such as picking them with nails, hitting them with hammers, or throwing them into bonfires, usually results in an accident.

Urge your children not to play with blasting caps, but if they do find one, have them notify an officer of the law or other responsible adult.

Prof. Richart Is New President of A.C.I.

At the recent meeting of the American Concrete Institute, F. E. Richart, research professor of engineering materials, University of Illinois, Urbana, Ill., was elected president; R. B. Young, testing engineer, Hydro-Electric Power Commission of Ontario, Toronto, Canada, senior vice-president; and R. W. Crum, Director, Highway Research Board, National Research Council, Washington, D. C., director.

Using Portable Plant to Serve Road Jobs

A portable crushing-and-screening plant is being operated this season by the Jeffery-Keys Sand & Gravel Co. of Batesville, Ark., to serve highway projects too far distant from its established operations.

Recent Equipment Installations ★ ★ ★

The Kirkpatrick Gravel Co., Cambridge City, Ind., installed a new Traylor 24-in. reduction crusher this spring. . . . *Stearns Model 9 Joltcrete machines have recently been purchased by Harrisburg Building Units, Inc., Harrisburg, Pa., and the Badger Concrete Co., Oshkosh, Wis.* . . . Sly dust collectors are being installed at the Winnipeg, Belleville and Montreal plants of the Canada Cement Co.

Ransome truck mixers have recently been placed in service by the Jacksonville Concrete Co., Jacksonville, Fla., and the Contee Sand & Gravel Co., Laurel, Md. . . . *A Cummins Diesel engine and a Traylor crusher are recent additions at the plant of the New Point Stone Co., New Point, Ind.* . . . Two Jaeger truck mixers have been installed for concrete deliveries by the Bowsman Washed Sand & Gravel Co., Troy, O.

The Turner Gravel Co., San Antonio, Tex., has started operating a new Dunbrik machine at its plant. . . . *Five Chain-Belt Rex truck mixers on International chassis have gone into service at the ready-mixed-concrete operations of the V. E. Schevenell Construction Co. at Memphis, Tenn.* . . . A Blaw-Knox mixer on a Ford truck is a new piece of equipment at the plant of Dave Lehr, Inc., San Antonio, Tex.

Changes Announced by Universal Atlas

ASSISTANT TREASURERS NAMED

T. E. O'Connor, treasurer, Universal Atlas Cement Co., announces the following appointments:

C. A. Keeley, assistant treasurer, New York. Mr. Keeley started with the company in 1920 and was successively promoted to western credit manager, cashier and assistant to treasurer and now assistant treasurer.

D. V. Johnson, assistant treasurer, Pittsburgh. Since 1928 he has been with Universal Atlas as salesman, assistant credit manager and credit manager.

J. Purdy, assistant treasurer, Birmingham. He began work with the Universal Atlas Cement Co. in 1923 where he has served in various capacities from stenographer to assistant credit manager.

K. S. Bates, assistant treasurer, Kansas City. He began work in 1924 with the Universal Atlas Cement Co. and has served as assistant credit manager and credit manager in the Chicago, St. Louis and Kansas City offices.

Under previous appointment, E. M. Johnson and A. B. Wells continue as assistant secretary-assistant treasurer at Chicago and New York, respectively.

Ohio Group Formed to Promote Hot-Mix Use

Robert Totterdale was elected president of the Hot Mixed Bituminous Industries of Ohio, Inc., at a recent meeting in Columbus. Others named were Herbert J. Murphy of the Newark Asphalt Products Co., vice president; H. G. Cooper, vice president of the Robinson, Burns & Cooper Co., treasurer, and C. W. Simpson, executive secretary.

At the meeting John Thorpe, president of the Thorpe Construction Co., Akron, was elected to the board of trustees to succeed Carl Stander, president of the Mansfield Asphalt Co., who resigned.

The group seeks to promote the use of "hot mix" road materials.

Medusa's Business on Upgrade, Says Dawson

Business of the Medusa Portland Cement Co. is showing a 15 per cent. improvement over that of the corresponding period last year, P. G. Dawson, vice president and treasurer, said following the annual organization meeting at which all officers were re-elected. The present rate of gain is likely to continue for several months at least, he indicated.

Competitive Minerals Cut Feldspar Sales

PRICES TOO SUFFER DECLINE

After climbing to two successive peaks in 1936 and 1937, the production of feldspar in the United States fell off sharply in 1938. The tonnage remained higher than it was in 1935 and compared favorably with the best pre-depression levels but the average values of ground and crude spar, as reported by producers to the Bureau of Mines, were the lowest in 15 or 20 years. Prices have been slightly lower but production centers have shifted so that much larger quantities of low-cost western feldspar are included in the national total.

Sales of crude feldspar in 1938 totaled 196,119 long tons, valued at $895,-081, a decrease of 27 per cent. in tonnage and 35 per cent. in value from 1937. North Carolina retained its rank as the largest producing state, notwithstanding a drop in output to 56,795 long tons in 1938, compared with 94,-595 tons in 1937 and 102,393 tons in 1936. Declines were reported in all states except Arizona, Connecticut and South Dakota.

Two new grinding mills were either under construction or contemplated at the end of the year, one in Virginia and the other in Connecticut. Studies of froth flotation, agglomerate tabling, and new electrostatic separation are being continued. A clean feldspar with less than 2 per cent. of the impurities and practically pure quartz are being concentrated at Keene, N. H., from a mine-run quartz-feldspar rock.

Nepheline syenite from Canada is now processed at plants at Keene, N. H. and West Paris, Me., in addition to the original American mill at Rochester, N. Y. Late in 1938 a new fluxing material called "aplite," having about the same alumina content as nepheline, went into production in Virginia. Tests also have indicated possible competition to feldspar from volcanic ash, particularly in the manufacture of colored glazes and perhaps in the glass and enamel fields.

Sanford E. Thompson Award Established

Committee C-9 on Concrete and Concrete Aggregates of the American Society for Testing Materials has established the Sanford E. Thompson Award to be made annually to the author or authors of a paper of outstanding merit on concrete or concrete aggregates presented at the preceding annual meeting of the Society. The award is named in honor of the first chairman of the committee. The purposes are to stimulate research, encourage the presentation of results of investigations that extend the knowledge of concrete and concrete aggregates, and to recognize meritorious efforts.

Under the rules governing the award, Committee C-9 will appoint annually a committee consisting of three members to review the papers that may be eligible. The award is to be made at one of the sessions on concrete. It will take the form of an honorarium of $50 with a suitable certificate.

Lehigh Erecting New 7-Story Office Bldg.

A new monolithic-concrete office building is under construction at Allentown, Pa., by the Lehigh Portland Cement Co. It will be known as the Young Bldg., a tribute to Col. E. M. Young, father of the present president of the Lehigh company, who died in 1932.

The structure will be 75 ft. by 100 ft. in size and seven stories tall. It will be completely air-conditioned. The Turner Construction Co., New York, N. Y., has the general contract for its erection. When completed, it will house the home offices and headquarters staff of the Lehigh company.

Form Concrete-Units Firm in Virginia

The Waynesboro Concrete Products Co. has been formed at Waynesboro, Va., by W. G. Mathews and H. S. King, and a plant for the production of concrete units as well as ready-mixed concrete is being erected. The site of the new venture is adjacent to good sand-and-gravel deposits formerly worked by the Mathews-Curtis Co.

Mr. King, who is treasurer and general manager, will be actively in charge. He is a graduate of Virginia Polytechnic Institute, class of 1928, and has been associated with a large construction company operating in New York state.

California Plant, Idle 9 Years, May Re-open

After having been closed for nine years, preparations are under way at the San Juan Bautista, Cal., plant of the Pacific Portland Cement Co. for a possible resumption of operations.

Frank F. Parker is superintendent. The plant was built in 1917 and was originally owned by the Old Mission Portland Cement Co. The Pacific company acquired it by consolidation in 1930, discontinued operations, and it has since lain idle.

New Agency Absorbs U. S. Roads Bureau

MacDONALD REMAINS AS CHIEF

The President's Reorganization Order of April 25 transfers the U. S. Bureau of Public Roads from the Department of Agriculture to a newly-created Federal Works Agency. The present chief of the Bureau of Public Roads, Thomas H. MacDonald, is to continue in charge, as Commissioner of Public Roads, of the administration of the Federal-aid Highway Act. The name of the Bureau is to be changed to Public Roads Administration. The head of the new Federal Works Agency, the Federal Works Administrator, is to exercise the same control over the Public Roads Administration as that now exercised by the Secretary of Agriculture over the Bureau of Public Roads. Appointment of the Commissioner of Public Roads in the future will rest solely with the Federal Works Administrator.

The Executive Order provides that unexpended funds would follow the various units to be incorporated into the new Federal Works Agency. Therefore, the unexpended balances and funds of the Bureau of Public Roads, including those for the fiscal year ending June 30, 1940, will be available to the Public Roads Administration.

German Cement Seized for Nonpayment of Fee

A protest from union representatives that German cement was being used in harbor improvements at the San Diego, Cal., waterfront has disclosed the fact that, while Nazi-made cement is actually being used, it cost the city nothing.

Approximately 2,000 bags were delivered several months ago by the German freighter *Weser*, consigned to a Long Beach broker. Failure to pay pier-storage fees resulted in the seizure of the cement by the San Diego Harbor Department and its use in the aforementioned improvements.

Slate Operators Meet; Discuss Future Plans

Tentative plans were recently discussed for the betterment of the slate industry in the New York-Vermont slate district at a meeting of a committee of 14 slate-quarry operators in Granville, N. Y.

The plans will be placed before a meeting of all operators in the district sometime in the future and then will be discussed with the workers.

Celotex Corp. Widens Scope of Operations

ACQUIRES AMERICAN GYPSUM CO.

Through the purchase of the American Gypsum Co., Port Clinton, O., the Celotex Corp., according to H. W. Collins, vice-president in charge of merchandising, enters the gypsum business and broadens its scope of service to the building industry. The purchase adds a complete line of gypsum wallboards, liner boards, gypsum lath and gypsum block, base and finish coat gypsum plasters, specialty plasters, acoustical plaster, land plaster, lime, building products and accessories.

The property includes a well-equipped, up-to-date plant and supply of high-grade gypsum rock.

C. F. Miller, formerly president of the American Gypsum Co. remains with the Celotex Corp. as general manager of the Port Clinton operations.

Bentonite Producers Seek Rate Reduction

A lower freight rate on Greybull bentonite has been applied for by the Wyoming Products Co. of Greybull, Wyo., to enable the company to sell and compete with other bentonite deposit areas. A 40c. rate to Seattle is being sought to enable the Wyoming firm to compete with California bentonite of a lower grade which is being shipped to Washington and Oregon for use in orchards.

B. M. Mayfield, manager of the company, reports that the company has an order for 1,600 tons of bentonite to be shipped to Butte, Mont., but high freight rates compel the company to ship by truck. The company has received several orders from foreign countries, but because of the high rail freight rates can not compete with other producing areas.

The Wyoming company now is building an electric line to the bentonite deposits located about 16 mi. from Greybull. A large pulverizer also is to be installed this year.

Rich Gypsum Deposit Revealed in Ontario

One of the richest deposits of gypsum in North America is being mined and developed far below the rich farm lands 3 mi. northeast of the village of Hagersville, Ont. The Canadian Gypsum Co., owner of the deposit employs 75 men working in eight-hour shifts. The gypsum is white in color and lies in a bed 4 ft. thick, 90 ft. below the surface.

RECENT GOVERNMENT CONTRACTS FOR MATERIALS UNDER THE PUBLIC CONTRACTS (WALSH-HEALEY) ACT

Date of Delivery 1939	Source of Supply	Government Agency	Commodity	Amount
Indef.	The Bessemer Limestone and Cement Co., Youngstown, O.	War, Engineer	Portland cement	$202,005.00
4/10	National Portland Cement Co., Brodhead, Pa. Lawrence Cement Co., Siegfried, Pa. Universal Atlas Cement Co., Northampton, Pa. Penn-Dixie Cement Co., Bath, Pa.	WPA, Treas., Proc.	Portland cement	37,638.00
5/31	Whitehall Cement Mfg. Co., Cementon, Pa.	WPA, Treas., Proc.	Portland cement	54,949.40
6/30	Allhoff Brothers, Inc., St. Louis, Mo.	WPA, Treas., Proc.	Portland cement	16,530.00
5/26	The Southern Co., San Antonio, Tex	War, QMC	Concrete pipe	13,642.80
6/17	John P. Callaghan, Inc., Harrison, N. J.	WPA, Treas., Proc.	Ready-mixed concrete	22,520.00
8/30	Colonial Sand & Stone Co., Inc., New York City	WPA, Treas., Proc.	Ready-mixed concrete	35,700.00
12/31	Liberty Limestone Corp., Rocky Point, Va.	Agriculture	Ground limestone	Indefinite
12/31	Bertha Mineral Div. of The New Jersey Zinc Co., Austinville, Va.	Agriculture	Agricultural limestone	Indefinite
12/31	James River Hydrate & Supply Co., Inc., Indian Rock, Va.	Agriculture	Grd. limestone	Indefinite
12/31	Bethlehem Steel Co., Bethlehem, Pa.	Agriculture	Agricultural limestone	Indefinite
12/31	Fred K. Betts, Jr., Harrisonburg, Va.	Agriculture	Agricultural limestone	Indefinite
12/31	American Limestone Co., Knoxville, Tenn.	Agriculture	Dolomite limestone	Indefinite
6/30	Lee Lime Corp., West Stockbridge, Mass.	Agriculture	Grd. limestone	Indefinite
6/30	The Hoosac Valley Lime Co., Inc., Adams, Mass.	Agriculture	Grd. limestone	Indefinite
6/30	D. U. Smith, Ashley Falls, Mass.	Agriculture	Agric. limestone	Indefinite
12/31	Maymead Lime Co., Shouns, Tenn.	Agriculture	Grd. limestone	Indefinite
6/30	Dermot Shemwell & Sons, Albany, Ga.	Agriculture	Grd. limestone	Indefinite
12/15	Pacific Rock & Gravel Co., Los Angeles, Calif.	War, Engineer	Aggregate, sand	45,400.00
Indef.	Standard Portland Cement Co., Painesville, O.	War, Engineer	Portland cement	201,000.00
6/30	Schwartz Supply Co., New Orleans, La.	WPA, Treas., Proc.	Portland cement	46,570.00
6/30	Home Lumber Co., Lawton, Okla.	WPA, Treas., Proc.	Portland cement	23,035.10
10/15	Medusa Portland Cement Co., Cleveland, Ohio	War, Engineer	Portland cement	11,232.00
Indef.	Criss and Shaver, Inc., Charleston, W. Va.	War, Engineer	Ready-mixed concrete	148,383.50
4/7	L. Romano Engineer Co., Seattle, Wash.	Interior	Sand & gravel	13,789.00
6/30	Jahncke Service, Inc., New Orleans, La.	WPA, Treas., Proc.	Concrete sand	12,000.00
6/30	Geo. Kellett & Sons, Inc., New Orleans, La.	WPA, Treas., Proc.	Gravel	39,200.00
Indef.	Monolith Portland Midwest Co., Denver, Colo.	Treas., Proc.	Portland cement	Indefinite
Indef.	Federal Cement Co., Buffalo, N. Y.	WPA, Treas., Proc.	Cement	13,845.00
7/31	Whitehall Cement Mfg. Co., Cementon, Pa.	WPA, Treas., Proc.	Portland cement	258,326.00
5/17	Independent Concrete Pipe Corp., Inc., Lockport, Ill.	WPA, Treas., Proc.	Concrete pipe	14,028.00
6/30	Tishomingo Concrete Pipe Co., Tishomingo, Okla.	WPA, Treas., Proc.	Concrete pipe	11,248.80
9/1	The France Stone Co., Indianapolis, Ind.	WPA, Treas., Proc.	Stone, slag	29,670.00
6/30	Ohio Valley Rock Asphalt Co., Louisville, Ky.	WPA, Treas., Proc.	Rock asphalt	13,716.00
6/30	John S. Lane & Son, Inc., Meriden, Conn.	War, Engineer	Trap rock	10,430.00
6/30	Grangers Mfg. Co., Boston, Mass.	Agriculture	Agric. grd. lime.	Indefinite
6/30	American Limestone Quarry Corp., Wingdale, N. Y.	Agriculture	Agric. grd. lime.	Indefinite
6/30	The Conklin Limestone Co., Inc., Canaan, Conn.	Agriculture	Grd. limestone	Indefinite
6/30	D. U. Smith, Ashley Falls, Mass.	Agriculture	Agric. limestone	Indefinite
6/30	Lee Lime Corp., Lee, Mass.	Agriculture	Pulv. agric. lime.	Indefinite
10/1	South Bend Sand & Gravel Corp., South Bend Ind.	WPA, Treas., Proc.	Gravel, sand	10,400.00
7/16	Medusa Portland Cement Co., Wampum, Pa.	WPA, Treas., Proc.	Cement	13,875.00
Indef.	Diamond Portland Cement Co., Middle Branch, O.	War, Engineer	Portland cement	201,000.00
4/18	California Portland Cement Co., Los Angeles, Cal.	WPA, Treas., Proc.	Portland cement	27,081.08
10/1	Universal Atlas Cement Co., Buffington, Ind.	WPA, Treas., Proc.	Portland cement	23,400.00
6/15	American Concrete & Steel Pipe Co., Los Angeles, Cal.	War, Engineer	Concrete pipe	39,417.20
6/1	M. F. Hickey Co., Inc., Brooklyn, N. Y.	Navy Purch. Office	Ready-mixed concrete	28,800.00
6/30	Champlain Valley Lime Co., Winooski, Vt.	Agriculture	Grd. limestone	Indefinite
6/30	Green Mountain Lime Corp., New Haven, Vt.	Agriculture	Hydrated lime	Indefinite
6/30	Amsden Co., Amsden, Vt.	Agriculture	Agric. grd. lime.	Indefinite
6/30	Hoosac Valley Lime Co., Inc., Adams, Mass.	Agriculture	Agric. grd. lime.	Indefinite
6/30	Pacific Portland Cement Co., San Francisco, Cal.	War, Engineer	Portland cement	29,718.00
5/15	Whitehall Cement Mfg. Co., Cementon, Pa.	WPA, Treas., Proc.	Portland cement	10,147.25
Indef.	Calaveras Cement Co. San Francisco, Cal.	Treas., Proc.	Portland cement	Indefinite
Indef.	Beaver Portland Cement Co., Portland, Ore.	Treas., Proc.	Portland cement	Indefinite
Indef.	Oregon Portland Cement Co., Portland, Ore.	Treas., Proc.	Portland cement	Indefinite
6/30	Whitehall Cement Mfg. Co., Cementon, Pa.	WPA, Treas., Proc.	Portland cement	13,161.65
4/8	Huron Portland Cement Co., Cleveland, O.	WPA, Treas., Proc.	Cement	296,000.00
4/5	Alpha Portland Cement Co., Ironton, O.	WPA, Treas., Proc.	Portland cement	26,520.00
4/9	Alpha Portland Cement Co., Ironton, O.	WPA, Treas., Proc.	Portland cement	20,200.00
4/11	Alpha Portland Cement Co., Ironton, O.	WPA, Treas., Proc.	Portland cement	20,400.00
4/11	Alpha Portland Cement Co., Ironton, O.	WPA, Treas., Proc.	Portland cement	53,040.00
4/11	Huron Portland Cement Co., Toledo, O.	WPA, Treas., Proc.	Portland cement	125,400.00
Indef.	Standard Portland Cement Co., Cleveland, O.	WPA, Treas., Proc.	Portland cement	45,225.00
Indef.	Huron Portland Cement Co., Detroit, Mich.	WPA, Treas., Proc.	Portland cement	17,730.00
Indef.	Pittsburg Plate Glass Co. Columbia Cement Div., Fultonham, O.	WPA, Treas., Proc.	Portland cement	43,945.00
3/20	Atlantic Cement Products, Inc., Hicksville, N.Y.	WPA, Treas., Proc.	Concrete pipe	15,746.00
Indef.	John P. Callaghan, Inc., Harrison, N. J.	WPA, Treas., Proc.	Ready-mixedconc.	11,180.00
6/30	Franklin Limestone Co., Nashville, Tenn.	Agriculture	Agric. limestone	Indefinite
6/30	Dolcito Quarry Co., Birmingham, Ala.	Agriculture	Dolomite	Indefinite
4/4	J. & L. Snouffer, Inc., Dublin, O.	WPA, Treas., Proc.	Limestone	14,437.50
4/7	Cleveland Builders Supply Co., Cleveland, O.	WPA, Treas., Proc.	Slag screenings	37,207.20
4/18	The Standard Slag Co., Youngstown, O.	WPA, Treas., Proc.	Slag	10,939.90
4/18	Carnegie-Illinois Steel Corp., Youngstown, O.	WPA, Treas., Proc.	Slag	19,041.21
5/15	O Brien Bros. Sand & Gravel Corp. Great Eastern Sand & Gravel Corp. Port Jefferson, Gallagher Bros. Sand & Gravel Corp. L. I., N.Y. J. Rich Steers, Inc., Northport, L. I., N. Y.	WPA, Treas., Proc.	Gravel	57,036.00
5/15	Flushing Sand & Stone Co., Inc., Jamaica, N.Y.	WPA, Treas., Proc.	Gravel	12,438.92
6/15	Seaboard Sand & Gravel Corp., Port Jefferson, N. Y.	WPA, Treas., Proc.	Sand, gravel	12,734.90

Soil-Cement Efforts Win Award for PCA

20 ASSOCIATIONS COMPETE

The Portland Cement Assn. won the 1939 American Trade Assn. Executives Award for development of soil-cement roads at the recent spring meeting of the trade-association executives held in Washington, D. C.

This award is made each year to that trade association which has rendered outstanding service to its industry, to industry in general, and to the public. The medallion representing this signal honor was presented to William M. Kinney, vice-president and general manager of the Portland Cement Assn. by Edward J. Noble, executive assistant to Harry L. Hopkins, Secretary of Commerce. There are more than 500 members of the American Trade Association Executives, and more than twenty exhibits competed for the Award which the Portland Cement Assn. won. Eight other associations were given certificates of honorable mention.

Bestowal of the award on the Portland Cement Assn. gives high recognition to the work of Frank T. Sheets, president of the association, who has directed the development of scientific laboratory and field methods for processing native soil, water, and Portland cement to produce a hard, all-weather, light-traffic highway costing $5,000 or less per mile of standard width two-lane pavement. Direct charge of both field and laboratory work has been in the hands of M. D. Catton of the development department.

Analyses to determine their suitability for soil-cement construction have been made of local soils from 44 states, the District of Columbia and Alaska. These investigations include soil identification tests and density determinations by means of compaction tests. By adding to native soil, water and cement of various proportions and carrying on wetting and drying, freezing and thawing tests, it is possible to determine just what mixture will produce the best results.

When given adequate soil-type determinations, laboratory test results to set up field controls, and proper selection and use of construction equipment, it is possible for engineers to predict in advance the serviceability of soil-cement roads. Success in construction is assured when controls set up in the laboratory are followed in the field.

In building soil-cement roads, the roadway is scarified to the finished depth required, cement is added and the soil thoroughly dry-mixed. Water then is added to bring the moisture content to the predetermined optimum in order to secure the desired density under compaction. Soil, cement, and water are thoroughly mixed to the full depth and width of the roadway, and the mixture is compacted from the bottom up with sheeps foot rollers. The top is smooth-rolled to produce a dense, uniform surface. It is covered with damp roadway soil or straw during the desired hardening period. It is then exposed to traffic until surface waste is worn off. At a later date the road may be given any bituminous topping needed to insure smooth-riding qualities or to reduce excessive abrasion.

Uses of soil-cement construction are many, although the greatest potential use lies in the field of light-traffic highways. The use of soil-cement mixtures for low-cost residential and farm building construction is just entering the research and experimental stage.

More than 20 acres of it have been used for walks and exhibit space at the San Francisco Fair. It has been used for driveways, for soil-erosion control, and for shoulders of concrete runways at large airports as well as for the runways themselves at smaller airports. Soil-cement is being employed on a large paving program for residential streets in an important southern city. A similar program is starting in a New England city. More than 200 miles of standard width highway, representing 96 projects in 26 states, are either built or are under construction.

Issues New Ruling on Wage-Hour Exemptions

Employers claiming exemption from the maximum hours and overtime provisions of the Fair Labor Standards Act because they have "1,000-hour" or annual wage contracts with certified representatives of their employees, are required, under new regulations issued by Administrator Elmer F. Andrews of the Wage and Hour Division, to keep a copy of the agreement on the premises. In addition they must file copies of such agreements, and of all subsequent amendments or additions thereto, within 30 days after they are made, with the Administrator at Washington, D. C.

Fire Sweeps Dredge; Causes $50,000 Loss

Fire caused $50,000 damage recently when it swept the dredge *Parkersburg*, owned by the Ohio River Sand & Gravel Co., Parkersburg, W. Va., while moored at New Martinsville, W. Va. A derrick boat was also destroyed.

Rebuilding of the craft has started and the dredge is expected to be able to resume operating about July 15. Two other dredges, the *George Vang* and the *Marietta* are owned by the company and are now working on the Ohio River.

New Cement Co. Gets New Mexico Charter

MANUFACTURING PLANS VAGUE

The New Mexico Portland Cement Co. of Albuquerque has been chartered by the New Mexico Corporation Commission. The articles of incorporation provide that the company may manufacture and sell cement, but incorporators report that no plans have been made as yet for opening up a quarry or erecting the necessary plant.

The company has an authorized capital stock of 15,000 shares without par value, 20 shares issued. Incorporators are Dudley Cornell, D. A. Macpherson Jr., and Rebecca Sabin.

Two Groups Soliciting Pacific Stock Proxies

The rift in the board of directors of Pacific Portland Cement Co., first revealed last winter when the company proposed a plan for eliminating dividends in arrears on its preferred stock, has not been healed, although the dividend plan has been dropped.

A group of three directors, John D. McKee, Herbert Fleishhacker and Ira Copley, reveals it can not agree with many of the policies advocated by the other members of the board, who are: Wm. F. Humphrey, Ken. Dawson, J. A. McCarthy, John G. Sutton, Milton H. Esberg, A. H. Canvin and Harry C. Hunt. Robert Henderson, also a director, is not active in the company's affairs because of illness.

Both groups have been soliciting proxies from stockholders for the annual meeting scheduled for June 2.

Allege Lime Officials Intimidated Strikers

In a detailed account of the dispute between the Pacific Lime Co. of Blubber Bay, B. C., and its employees, Grant MacNeil told the House of Commons, Canada, that the firm had "used its power to intimidate employees and influenced provincial law enforcement officers to put the strikers at a disadvantage."

The account was given by MacNeil in connection with the discussion of a bill before the House which would amend the Criminal Code so that firms would be prevented from interfering with the rights of employees to organize.

EDITORIAL

Bad Neighbors

ONE of the results of economic crises most dangerous to social and economic welfare is the artificial control of the sources of supply which business attempts to set up in times of low demand for its goods. In recent years the desire to effect such a control has met with considerable success, due principally perhaps to the severity of the decline in business which has characterized the last decade. Protectionism, which once was a purely academic subject, has become a widely accepted method of appeasing complaining business men and of temporarily alleviating their economic distress. That it fails to accomplish any worth-while gains is quite beside the point. The growing belief in its efficacy should alarm those who are concerned with long-run progress.

Business conditions do not in themselves create the desire for protection from competition, but when business is what is generally described as "bad," the feeling of discouragement, weakness and insecurity rises to new heights and the demand for protection finds expression in repressive legislation, retaliatory and discriminatory business practices, and subversive activities of many kinds.

Long before the last period of reduced business activity set in there was opposition to the freedom of competition that had come to be known as "the life of trade." The so-called independent merchant had set up a cry against what he called the piracy of chain-store organizations and the result was taxes on the business done by them in twenty-three of the forty-eight states. Taxes on oleomargarine have been imposed in eleven butter-producing states, in twelve states which are trying to protect the production of local oils, and in six others for various reasons. Levies of as much as three per cent. in one state are being made against "foreign" building materials in the form of use taxes. In our own aggregates industries we have seen attempts to protect, by means of proposed legislation and material specifications, the business of permanent plants from the competition of portable plants. There have been cases of a desire to limit cement purchases to manufacturers buying local fuels.

Thirty states favor local residents in public employment; in twenty-eight states there is legal discrimination in favor of local produce in public purchases. Some of the laws in the former class were passed as early as 1889 and in the latter class as early as 1897, but in both classes most of the legislation was enacted in the 1929-to-1935 period. Seven states have adopted discriminatory taxation on "foreign" corporations, twenty-five states on "foreign" life-insurance companies, twenty-one states on "foreign" fire-insurance companies, while ten states impose discriminatory taxes favoring life-insurance companies with local investments. Thirty-two states have set up requirements for the establishment of legal settlement, demanding in five cases as much as five years' residence.

These are examples of economic sectionalism at its worst. The dangers are not only of local effect and significance; they menace the economic and political stability of the nation as a whole. Economic sectionalism is but the forerunner of political sectionalism, because the desires of economic groups can find practical satisfaction most easily through the exercise of the police power of political agencies. A desire to exclude a given type of product, or the product of a given place of origin, can be made effective only through legal restriction. Border lines that were originally determined solely for the purpose of marking off the areas of local government control are fast becoming separating walls in the field of economics and are being transformed into political barriers almost as unfriendly and provocative as international borders. We are headed in the direction of political conditions which will simulate, if they do not actually duplicate, the unsettled conditions that prevailed under the Articles of Confederation. Just as the economic sectionalism of the old South threatened the unity of the entire nation, so the selfish and unwisely expressed sectionalism of individual states threatens again the economic and political solidarity of the country.

POLITICAL history provides many examples of the ways in which economic sectionalism, when given political sanction, has fostered mistrust, hatred and armed conflict. In the development of world civilization, as in the evolution of human life and culture in individual continents, at least two lines of progress have been available, at least two philosophies have made their appeal. At one extreme we have had the principle of individualism, which, carried to its logical end, would result in some form of philosophical anarchism, the very negation of government. As an alternative there has been the principle of collectivism, under which government would become even more powerful than any individual state of modern times. Advocating the one have been powerful minds in the field of political philosophy; giving practical effect to the other have been the tyrants, the world-empire builders of all ages. Somewhat near the middle point between these two extremes has lain the objective of modern political philosophy, which would give to the individual as much liberty and freedom of action as is consistent with the general good and only as much governmental supervision as is necessary to promote and protect that general good.

Late-modern history has given reason for hope that the political barriers that have separated peoples would

tend to disappear, that we were witnessing a softening of the mistrusts, an improvement in the understanding, between nations, that peoples of all political philosophies were coming to see the great advantages to human well-being and happiness of greater interdependence and intermingling. Yet in a nation, founded on the principle of harmonious coöperation in the interest of the general good and on a desire to make the conditions of a happy life available to as many people as might desire to enjoy it, we see an alarming development of the desire for local economic sufficiency, dependent not alone on the ready economic availability of the materials needed for existence but bolstered by fallacious claims enforced by legislative discriminations. At a time when world thought, save for isolated cases of aberrant tendencies visible abroad, was showing a growing appreciation of the advantages of a genuinely humane world outlook, we in this loudly-proclaimed "cradle of liberty" are giving effect to the narrowest views of economic and political theory. Awareness of the increasing economic interdependence of the nations of the world has been growing with the advance of technology, which has tended to weaken the economic and political barriers between peoples. Yet here, perhaps because of our own national economic self-sufficiency, we are giving legal effect to economic principles that are unsound, contrary to the economic well-being of the country as a whole, and destructive of the political philosophy that has erected on the foundation of thirteen separate political entities a nation of forty-eight federated states. Under the transparent cloak of a feigned regard for the inviolability of states' rights local business men, with the support of local politicians, are imposing upon American business restrictions that are more ominous in their present effects and in the dangers they foreshadow than any of the widely-deplored signs of increasing centralization in government which have become evident here in recent years.

THE problem is not new, nor are people only now becoming aware of it. In 1789 Alexander Hamilton said: "The interfering and unneighborly regulations of some states, contrary to the true spirit of the Union, have in different instances, given just cause of umbrage and complaint to others, and it is to be feared that examples of this nature, if not restrained by national control, would be multiplied and extended till they became not less serious sources of animosity and discord than injurious impediments to the intercourse between different parts of the confederacy." The Constitution, in its provisions giving the Federal government the right to regulate interstate commerce, recognizes the fact that such regulation can not be left to the whims, special interests and localized prejudices of the individual states without injurious consequences. According to the Constitution, only the trade in intoxicating liquors and prison-made goods can be embargoed, restricted, or regulated by individual states. The regulation of other trade is left to the Federal government, where it should reside, if justice is to be done to all sections of the country and to all sections of the populace.

On this question Robert H. Jackson, Solicitor General of the United States, made some pointed remarks in a recent address in Chicago. Speaking before the National Conference on Interstate Trade Barriers, he said in part: "The Federal government owes the duty to police the channels of interstate trade to protect it from the racketeer, the monopolist, and the price fixer. Often it has been inadequately discharged. . . . But no neglect of the Federal duty can justify the imposition by local law of restraints as damaging to trade as the predatory private restraints. Tariff barriers, community isolation, and discriminatory administration will not save or help local independence or local self-sufficiency. They do not free commerce; they prostrate it. The states can not help solve great economic problems, such as the concentration of wealth and control of industry, by boycotting each other."

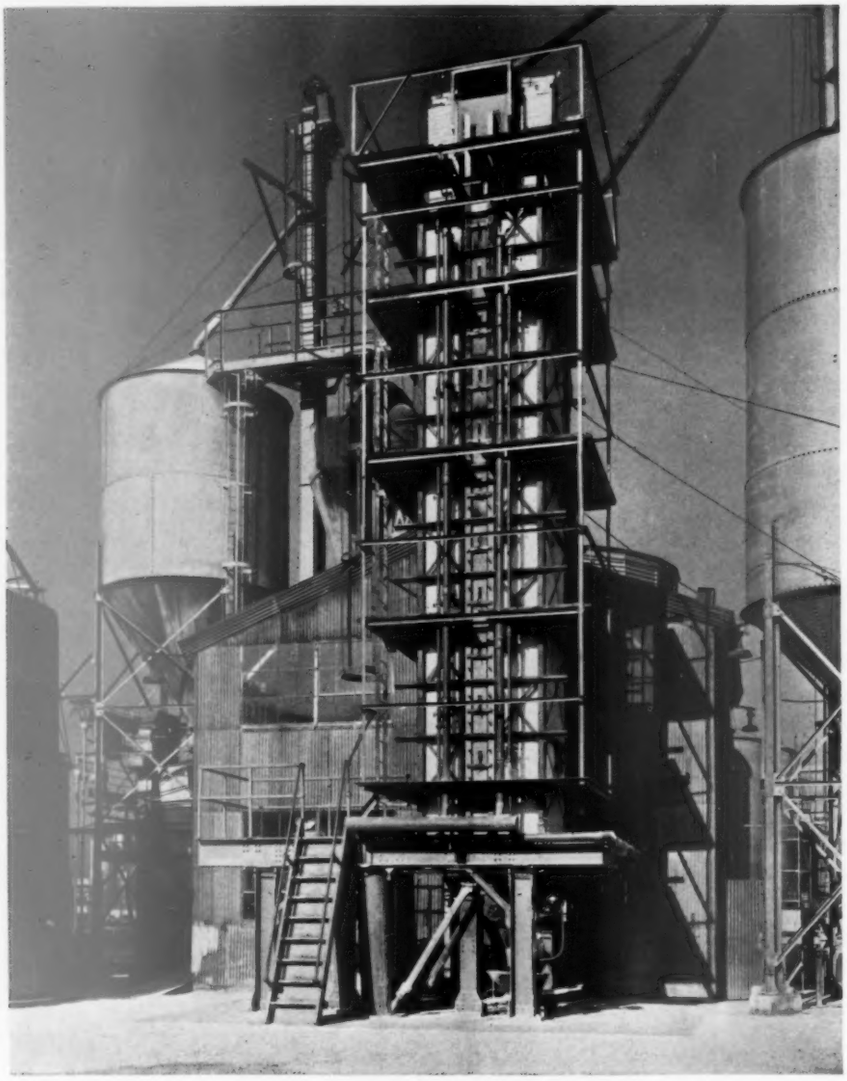
PROSPERITY is dependent on the free interchange of commodities, which necessitates free access to markets. If states set up special taxes discriminatory against outside-the-state businesses or products, they not only impose unwarranted restrictions on the free action of those businesses, but they needlessly and unjustifiably restrict the freedom of choice and the accessibility to the markets and goods of other states of their own citizens. Such action is more often than not likely to be the result of political pressure applied by local business men having very special and, perhaps, even temporary interests, which should be made subordinate and subservient to, rather than superior to and dominant of, the general interest, according to the principles of modern social thought.

If the activities of manufacturers and producers are to be limited to the markets available in their home states, they can not be expected to invest as heavily in plants and machinery or to employ as many workmen as they would under a policy of the free flow of commerce between the states. Business enterprise will be discouraged instead of being stimulated. Consumers, whether individual or corporate, have the right to the choice of commodities made available through free access to markets in all the states. The number and extent of their purchases will be greatly reduced by laws that attempt in one way or another to hamper them in the exercise of their right to purchase the products that they need at the prices they feel they can afford to pay. Mass production depends on mass consumption and both depend on the ability of goods to move freely across state lines without the obstructive influence of local regulations.

This is another of the many cases in which the well-being of consumers and business men must take precedence over the selfish interests of local groups, whose economic views are bounded by the physical dimensions of their own cash drawers and seldom, if ever, extend beyond the expediency of the passing hour.

By W. E. TRAUFFER

IMPROVES RECOVERY OF CARBON DIOXIDE



The new retort or kiln in which indirect heat is used to produce pure CO_2 gas and lime.

The plant of the Frozen Carbonic Corp. with the new generator at extreme right.

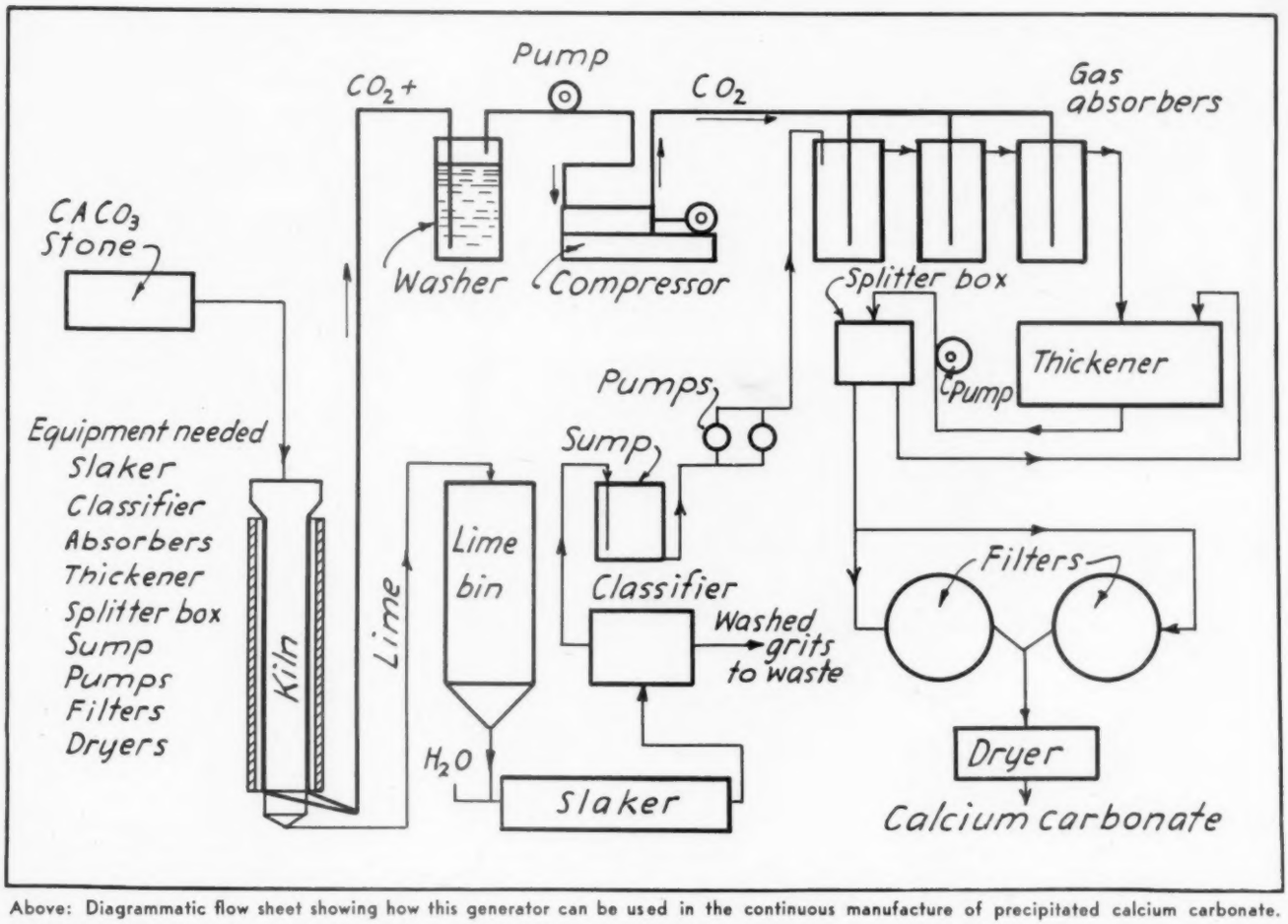
IN an effort to keep its readers informed of the latest developments of importance PIT AND QUARRY has published several articles describing the development of the Gillette system for manufacturing, in a closed retort using indirect heat, pure carbon-dioxide gas with lime as a salable by-product. In the September, 1933, issue appeared an article describing an experimental plant which had demonstrated the commercial practicability of this system. In the November, 1936, issue another article described in detail a commercial installation of the Gillette system by the Frozen Carbonic Corp. at Neville Island, Pittsburgh, Pa. The present article describes the improved Gillette system which has been developed at this plant through intensive research and experimentation made under practical operating conditions.

The original generator consisted of four Carbofrax tubes 30 ft. high with inside dimensions of 2½ in. by 28 in. These tubes were arranged radially at quadrants about the center of the circular generator, thus forming four separate firing chambers lined with firebrick and having suspended-arch furnace walls. Each firing chamber had an individual air-mixing gas burner at the bottom and a stack for natural draft. Each tube was sealed at the bottom by a rotary feeder which also controlled the rate of discharge. This generator produced gas for from 8 to 10 tons of solid carbon dioxide and 14 to 16 tons of lime in 24 hr.

It was found, however, that the radial design of this generator made it difficult to control accurately the burning of the lime and, consequently, its quality. As a result some of the lime produced was under burned and had to be sold for agricultural purposes at comparatively low prices. The design also made it necessary to shut down the generator for 24 hr. every week to clean the louvres which become clogged up with dust.

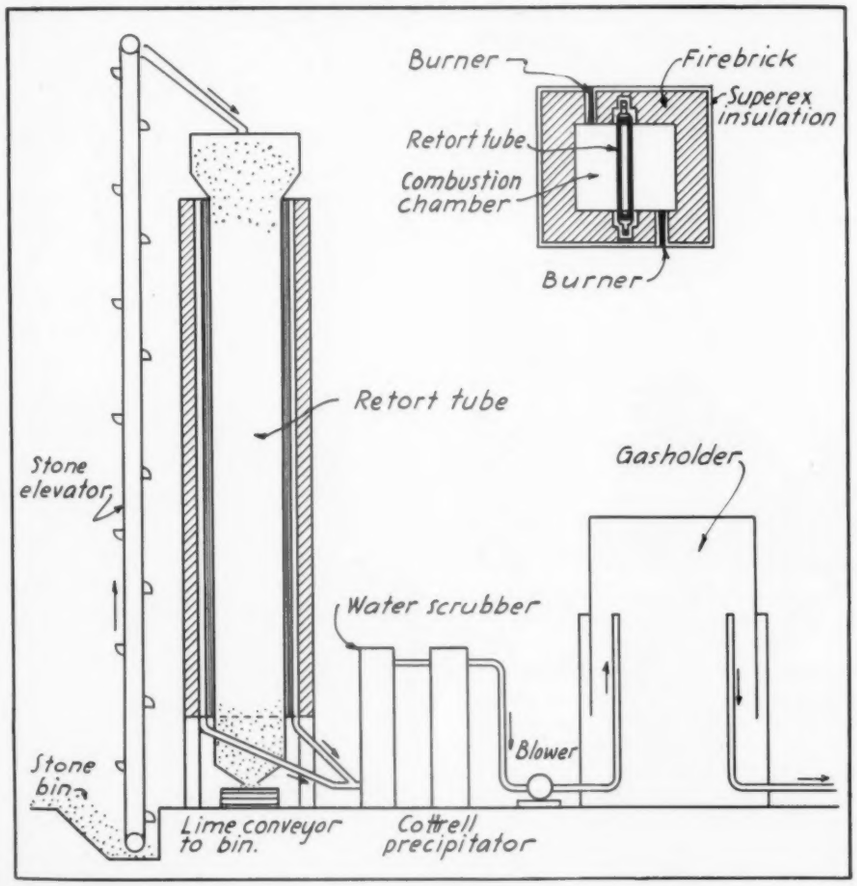
The new generator has larger louvres and is so designed that they can be cleaned with a portable vacuum cleaner by following the stone down as it passes through the generator. Only a 2-hr. shut-down is now necessary on alternate cleanings as a fairly good job of cleaning can now be done without shutting down at all. The dust from this system is negligible and less than 25 lb. per week is collected when cleaning.

The new generator consists of a ver-



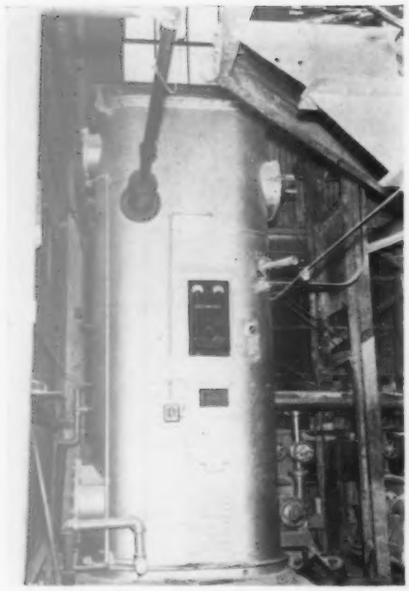
Above: Diagrammatic flow sheet showing how this generator can be used in the continuous manufacture of precipitated calcium carbonate.

Below: Schematic drawing of new rectangular type CO_2 generator and related equipment.



tical rectangular retort of Carbofrax 29½ ft. high with inside dimensions of 2½ in. by 36 in. The Carbofrax walls are 1½ in. thick and are composed of approximately 580 pieces of an interlocking type of Carbofrax tile made in 30 different shapes, each 6 in. high. This retort is flanked on each side by a combustion chamber having inside dimensions of 18½ in. by 36 in. The walls are of firebrick 13½ in. thick, well insulated on the outside with Johns-Manville Superex.

A special type of spring support for the ends of the retort was developed to absorb the expansion and contraction and to keep the titles under compression at all times. The retort design is such that when it becomes necessary to replace any of the tiles the spring supports and the insulating bricks which transfer the pressure to the tiles are removed. Any desired Carbofrax tiles can then be removed and replaced. The new generator can be cooled down or heated up in a period of 2 days compared to the 10 days required with the old generator, considerably reducing the delay. The lining of the entire retort could be replaced in 4 days but the usual partial replacement takes only a few hours. Such shut-downs are infrequent as this Carbofrax tile needs only 50 per cent. replacement over a



The electrical precipitator which removes impurities from CO_2 gas.

year's time. The average life of a tile is about 18 months.

This refractory was selected only after exhaustive tests had been made of all available types including high-alumina, silica, silicon-carbide mixed with fireclay and other ingredients as well as nickel and chrome-nickel steels. Carbofrax was selected because it had the best resistance to both heat and abrasion, and also because of its high thermal conductivity, an important factor in the indirect calcining method used. Since the original installation this tile has been so improved that its life has been tripled.

When this generator was built 24 burners were installed but in actual practice it was found necessary to use only 6. In future generators only 6 burners will be installed. Three are used on each side of the generator and these are spaced equal distances apart. Heat is now concentrated nearer the top of the generator, so that the stone is heated more quickly and the initial calcination takes place sooner than in the old generator. About half the calcining is now done in the top third of the generator. This improved method of burning has resulted in a 35 per cent. increase in the capacity per sq. ft. of Carbofrax tile in place.

A preheater with a cross-section larger than that of the retort is now being perfected. This will be installed above the generator and the waste gases will be drawn through it by a draft fan. It is expected that this equipment will preheat the stone to about 1,000 deg. F. A reduction of about 20 per cent. in fuel consumption and some increase in capacity are expected.

Limestone is received in railroad hopper cars and is discharged into a track hopper. A Jeffrey pan-conveyor feeds it to a Jeffrey bucket-elevator from which the stone is discharged either into the new generator or into a 100-ton circular steel storage bin. This system has not been changed since last described. Stone from this bin is fed to the elevator for generator feed.

Well-graded, washed limestone of one of three sizes, ¾-in. to ⅜-in., ½-in. to ¼-in., or ⅜-in. to 3/16-in., is used,

The snow press which makes 50-lb. dry-ice cubes under 2,000-lb. pressure.

depending on the size of lump lime in demand. These are sizes of limestone for which there is little commercial demand. This stone is fed into the generator at the rate of about 8 tons per day. It is subjected to a temperature of about 1,600 deg. F. at the top and about 2,100 deg. F. at the bottom of the combustion chamber. The material takes about 2 hr. and 20 min. to pass through the 29½-ft. height of the generator. Either high-magnesium or high-calcium limestone can be used,

A cross-section of the generator which shows the retort and one firing chamber.

the quality of the lime produced depending on the purity of the stone.

From the 8 tons of stone about 3 tons of CO_2 gas and 4¾ tons of lime are produced. These are average figures, but with a high grade of stone 4.2 tons of CO_2 and 6.5 tons of lime have been produced in one day. The CO_2 yield is normally 90 per cent. with a purity of from 97 to 99 per cent. A 98-per cent. yield can be obtained with a lower gas purity of about 90 per cent. The lime produced has a CO_2 content varying from 2 per cent. to less than 1 per cent. The normal fuel consumption is about 2,500,000 B.t.u. per hr. and 25 gal. of water per min. is required, about equally divided between the gas cooler and the water-cooled section at the bottom of the furnace.

The operation of this generator is almost entirely automatic and warning signals protect the equipment if anything goes wrong. Only one man is required to operate it and the dry-ice plant, and he could as easily take care of three generators. Any number of generators can be added, using the same material-handling equipment. Three such generators would have about the same capacity as the old radial generator but would cost less to build because standard shapes of firebrick, insulation and steel are used. They would also give greater flexibility of production as each would be operated independently. This is important as dry ice is a perishable product even in cold storage, and production should be kept fairly close to the demand.

There have been no changes in the methods or equipment used in making dry ice from the CO_2 gas since these operations were last described in PIT AND QUARRY. A Research Corp. Cottrell electrical precipitator was installed in the lime and CO_2 building late in 1937. All the gas is passed through this precipitator before going to the ice plant. This unit removes sodium chloride in fine vapor form which is given off with the CO_2 gas. If not removed the sodium chloride precipitates when the gas is compressed in the ice machine and corrodes the metal parts. This process does not affect the CO_2 gas in any way.

The ice plant was designed by the York Ice Machinery Co., which also

(*Continued on page 48*)

Continuous feeder which discharges lime on belt conveyor.

Performance Measurement and Mechanical Control—III

By ROBERT W. ROTHROCK, Ph.D.

●

Doctor Rothrock began his career in research and engineering development with the Aluminum Co. of America in 1925, later joining the Universal Gypsum & Lime Co. where his work was directed toward conservation of raw materials and the improvement of processing procedures. In 1928 he helped design and build the Diamond Springs Lime Co. plant in California, an oil-fired, rotary-kiln operation, remaining until 1931 when he returned to Ohio State University to advance his studies, obtaining his Ph.D. in chemical engineering in 1933. He has since taught at the university and has been engaged in consulting work in nonmetallic minerals.—*Editor.*

●

IN the previous chapter a brief presentation of equilibrium diagrams was made to show that the variable relationships which may take place between lime, alumina and silica during calcination and subsequent cooling, make possible the formation of a large number of different compounds from these three components, some compatible and some not compatible. In the present chapter practical results possible through accurate control, particularly in the calcination of cement-producing minerals will be further emphasized.

The component materials which make up the raw mix of Portland cement manufacture are, as stated, of a clay and lime nature, such as limestone and clay or shale. In modern American rotary-kiln practice these materials are finely ground and intimately mixed either dry or as a wet slurry and fed into the kiln at the lower temperature end where the flue gases leave the kiln. Gradually, by the effect of gravity and the rotation of the sloping kiln, they move through the kiln. Carbon dioxide is driven from the limestone as the materials advance into higher-temperature regions and finally reach the hot or clinkering zone of the kiln, where the temperature is maintained high enough so that calcination, sintering and fusion, or melting together of the raw materials, takes place.

Purpose of Calcination.—The purpose of the calcination process is to change one set of minerals, namely lime and clay materials which have definite physical properties and characteristic compositions, into new minerals having different but equally definite physical properties and characteristic compositions. The effect of the addition or abstraction of heat in any such system of minerals is to change the relative amounts of the different phases present.

The cement manufacturer is not concerned so much with the exact chamical composition of the finished product as he is with the kind and proportion of definite minerals present. The main constituent minerals are:

1. Tricalcium silicate (3CaO. SiO_2, or more briefly represented by C_3S),
2. Beta dicalcium silicate (2CaO. SiO_2 or C_2S),
3. Tricalcium aluminate (3CaO. Al_2O_3 or C_3A),
4. Monocalcium aluminate (CaO. Al_2O_3 or CA).

The minerals really desired and necessary for ordinary Portland cement are the silicates. These are poor conductors of heat, they may remain so viscous that even when melted they are capable of being highly super-heated.

Properties of the Constituent Minerals.—Tricalcium aluminate (C_3A) gives quick-setting properties to Portland cement; it hydrates rapidly. It is present generally in about 25 to 30 per cent. of quick-setting cements. However, it adds practically nothing to the permanent strength of the cement. Its principal function is to reduce the temperature at which the reaction between lime and dicalcium silicate takes place to form tricalcium silicate. In ordinary Portland cement it has a flash-set and gypsum is added to retard it.

Dicalcium silicate occurs in two forms.

1. The gamma form, which is unstable at atmospheric temperatures, has no hydraulic properties and swells with disintegration on cooling. This is commonly known as "dusting." Its presence indicates an under-fired product.
2. The beta form is the stable one. It forms largely above 1,420 deg. C. The higher the super-heat above 1,420 deg. C., the more stable the finished Portland cement will be.

Tricalcium silicate and dicalcium silicate are the more essential constituents of Portland cement. Tricalcium silicate is most important; about 75 per cent. of the strength in Portland cement is due to it. It sets and hardens in approximately 7 days, while dicalcium silicate sets in 28 to 60 days.

Monocalcium aluminate (CA), which may be present in small quantities, gives early strength and is considered an essential constituent of high early strength cements.

Reason for Fluxing Materials.—Because of the lack of more suitable refractory materials with which to line the kilns, in commercial manufacture, Portland-cement mixtures can not safely be heated to as high a temperature as theoretically necessary for the formation of the most desired constituents. For this reason fluxing materials are added to the raw feed to bring about their formation, at least partially, at lower temperatures. This is possible, since in such a mineral system temperature and composition bear practically a reciprocal relationship to each other.

Iron oxide and silica favor the formation of tricalcium silicate while alumina favors the formation of dicalcium silicate. Calcium ferrite formed in the progress of the process tends to dissolve both the lime and the calcium silicate and thus bring them together for the formation of the higher silicates.

Progressive Reactions in the Kiln.—In the calcination process the composition of the mix varies continuously from the time it enters the kiln until it leaves. Dicalcium silicate begins to form early as the raw materials progress through the kiln; it is believed that it begins to form even before all the carbon dioxide is driven from the limestone. In other words, the affinity of the lime and silica for each other is so great that as soon as free lime is present the reaction between the lime and silica starts. The important and difficult reaction is for the dicalcium silicate to pick up enough additional lime to form tricalcium silicate in the proportions desired.

Dicalcium silicate does take up lime rapidly in the finely-ground state to form tricalcium silicate. Finally, however, a stage is reached in the hot zone of the kiln where no more lime is taken up, perhaps due to the fusing which occurs on the surfaces of the clinker.

To increase the proportion and promote the formation of tricalcium sili-

cate the following procedures have been practiced:

1. Fine grinding once-burned clinker, mixing it with fresh lime and reburning the new mixture.

2. Forming dicalcium ferrite, which carries the lime through the dicalcium silicate stage to tricalcium silicate.

Temperature; Time Control.—The practice in most present-day plants has been to heat the mass of limestone and argillaceous material for a given period at a sufficiently high temperature to form the desired minerals, and then cool them rapidly to bring about crystallization quickly in order to hold the minerals as formed.

The temperature and the time of their exposure to the heat has generally been found for a given mixture by cut-and-try methods and thereafter maintained through dependence upon the eye of the experienced kiln operator. By this procedure kiln operators, trained in the art, have provided the bulk of the Portland cement used throughout the world. However, those operators who have made use of such instruments as have been available to assist them undoubtedly have experienced fewer anxious moments concerning the outcome of their judgment of kiln conditions.

One type of instrument which effectively assists kiln operators in manipulating fires and regulating draft in order to maintain kiln temperature within close limits is shown in Fig. 1.

The color of the hot kiln lining is one criterion upon which the rotary-kiln operator bases visual control in the absence of instruments. In the instrument application pictured the temperature-measuring device is so installed that it detects the temperature of the kiln lining in the hottest section of the burning zone of a powdered-coal-fired kiln.

Effect of Temperature and Time on Mineral Formation.—Following the path of crystallization on an enlarged portion of the lime-alumina-silica equilibrium diagram shown in Fig. 2 illustrates the importance of controlling calcination temperature as well as of cooling after the "peak" temperature has been reached. The shaded circle represents the approximate range in the composition of Portland cement. During calcination of a mixture of a composition within the shaded circle, if the temperature of the kiln, the duration of burning, the fineness of grinding and the intimacy of mixing have been correct to form a melt, the crystallization path of the product on cooling will, if all the lime has been consumed in the reaction, follow the upper curve, 18 toward 16; if all the lime has not been used in the reaction, crystallization follows the lower curve, 18 toward 17. Along 18-17 from 18 to Y lime (CaO) wholly or partially disappears while tricalcium silicate (C_3S) crystallizes, and from Y to 17 lime (CaO) and C_3S separate together. Along boundary 18-16 from 18 to Z dicalcium silicate (C_2S) and C_3S separate together; from Z to 16 C_3S disappears while C_2S separates. Following the upper curve 18-16, when 16 is reached a new phase, tricalcium aluminate (C_3A), appears and if crystallization proceeds further C_3A replaces C_3S. Therefore, it is essential that the mass be cooled promptly to hold a high C_3S content in the finished product.

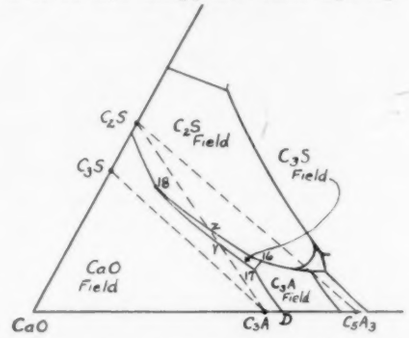


Fig. 2. Crystallization paths of Portland-cement mixtures indicated by the phase-equilibrium diagram.

Along the boundary line D-17 lime (CaO) wholly or partially disapears while C_3A separates during the course of any crystallization which follows this boundary.

From the equilibrium data presented it should be apparent that, even though the raw materials may have been properly proportioned, mixed and fused, there is still opportunity of not securing a suitable finished product through irregular or uncontrolled cooling of the clinkered mass after calcination.

How Minerals Formed Are Identified.—Chemical analysis is, of course, applied in the control of cement raw materials and of the finished cement. However, it is well known that all transparent substances allow light to pass through them and, like window glass, all "bend" the beam of light as it passes through. A measure of the amount of bending determines what is known as the index of refraction for the mineral. The polarizing microscope is an instrument for measuring the amount of bending. This measuring device is one of the most interesting optical instruments used in control work and in investigations to determine mineral composition of mineral products. The principal minerals in Portland cement are transparent and each has a different index of refraction which can be measured accurately with the polarizing microscope. There are innumerable applications for this measuring device in the daily work of mineral chemists, though peculiarly enough there are only a few who use it.

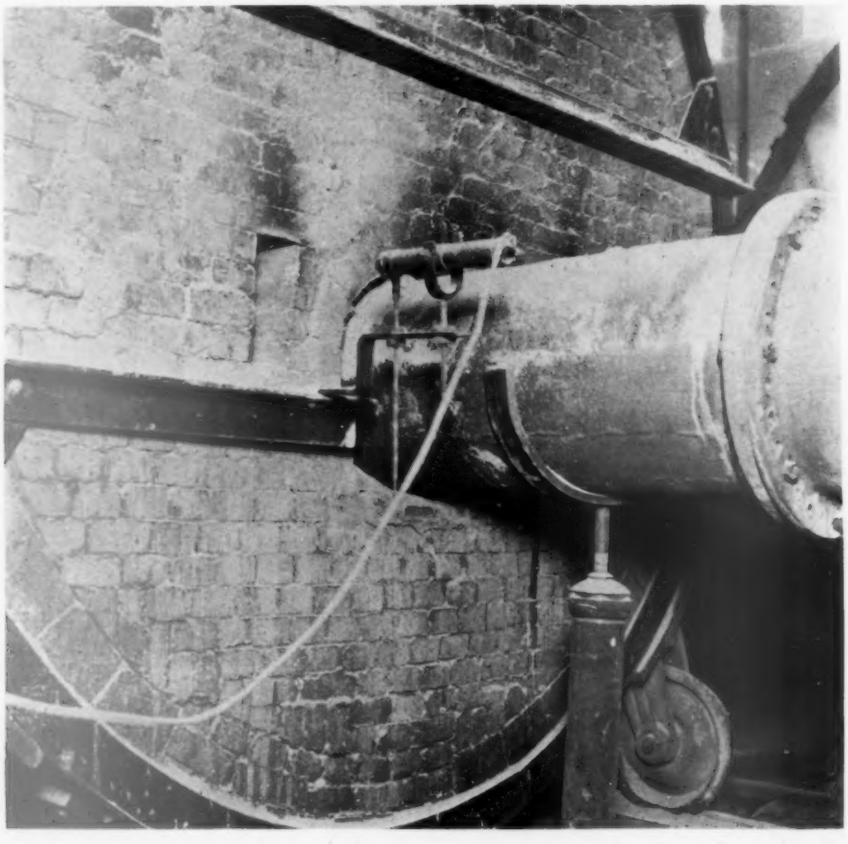


Fig. 1. Radiation pyrometer applied to rotary kiln for measuring hot-zone temperatures (Photo courtesy of Thwing Instrument Co.)

General view showing portable and stationary parts of the plant. Drag-line and shovel in foreground.

The portable plant which is used for scalping and crushing.

Scalping and Crushing Handled by Portable Plant in This Pit

IN some sections of the country where the demand for aggregates is not large or steady enough to justify the erection of large stationary plants, some interesting operations of small or medium size have been developed. The state of Wisconsin abounds with such plants, some of which are portable, some temporary, and some permanent. Others are a combination of portable and stationary equipment. The operations of the Hartland-Verona Gravel Co. at Verona, Wis., fall in the latter class.

This company's deposit, 10 mi. west of Madison, was originally opened by a contractor in 1924 and passed through several other hands before it was taken over in 1934 by the present owners. The existing stationary plant was improved at that time by the installation of a crusher and a screen and the drag-scraper method of excavation was replaced by a drag-line. In 1936 a portable plant was purchased. This is used for scalping and crushing ahead of the stationary plant, which is now used for final sizing and storage. The latest development is a step-type shell with renewable face plates which is used on the roll-crusher at this plant. The same owners also operate the Hartland Washed Sand & Gravel Co. at Hartland, Wis., where a similar crusher is used.

The deposit has 4 ft. of overburden which was removed as the pit was enlarged. The deposit extends 20 ft. above ground-water level and was worked on that level for a considerable area. An Osgood drag-line with a 1¼-cu.yd. bucket is now excavating to a depth of 24 ft. below water-level. The material is discharged on a pile from which a ½-cu.yd. P & H shovel transfers it to the hopper of the Lippman portable plant. This hopper is at the end of a series of two field belt-conveyors which can be swung in an arc about the plant as digging progresses. When the area within reach is worked out this plant is moved to a new location.

The second belt-conveyor discharges the material on a 4-ft. by 10-ft. double-deck vibrating screen. Gravel retained on the top deck is discharged into a 14-in. by 45-in. jaw crusher. A pivoted-bucket conveyor feeds the crusher product back to the conveyor running to the screen. The material retained on the bottom deck of the screen is discharged into a 24-in. by 42-in. double-

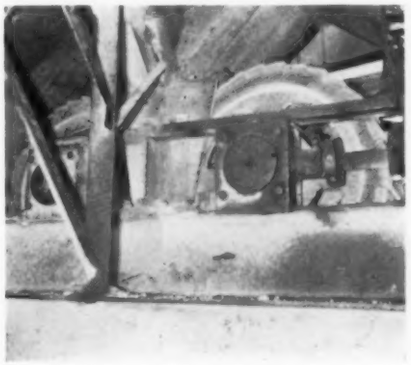
Close-up view showing both crushers, elevator, conveyors and vibrating screen.

roll crusher, whose product is carried back to the screen by a bucket-elevator and a belt-conveyor.

The openings in the bottom deck are 1½-in. in size when washed gravel is in demand and ¾-in. when road gravel is being produced. Material through this deck, a mixture of gravel, crushed gravel and sand, is carried on a belt-conveyor to the top of the stationary plant. A revolving screen removes the sand, which is fed to a sand drag and then into a storage bin. The gravel is split to a pair of 42-in. by 4-ft. Robins Gyrex double-deck screens which produce pea gravel and two sizes of gravel.

Deliveries are made in five company-owned Ford trucks which are loaded under the bins. All the shipments are weighed on a Fairbanks truck scale.

Power for plant operation is supplied by a 180-hp. Waukesha Hesselman engine driving a generator. The crusher is driven direct and the other equip-



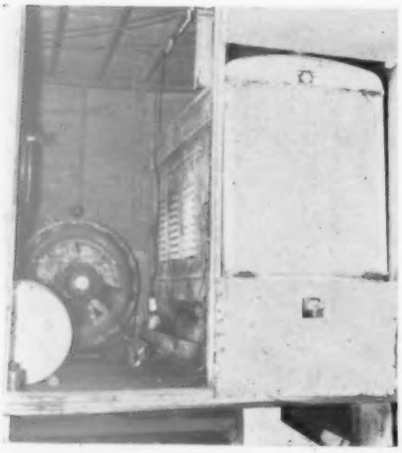
Special stepped shells and removable plates are used on the roll crusher.

Shovel loading hopper of field conveyor. Drag-line is at left.

ment is operated by individual electric motors.

The roll-crusher used in the portable plant originally had smooth rolls but these were unable to nip smooth and rounded pieces of gravel and, as a result, were subjected to excessive wear. Heavy transverse ridges, spaced 8 in. apart, were then welded on the faces of these rolls, but these fared no better. According to Percy W. Palmer, president of the company, the material is so abrasive that at the end of the first week of operation the ridges were entirely worn off and the shells badly grooved. An expensive welding job was necessary each week for the remainder of the season.

During the winter Mr. Palmer developed a step-face shell for these rolls which worked so well that he had it patented. This shell has its face cut in steps in such a way that face plates can be bolted on each step to take the wear. The bolts are countersunk in the plates and extend through the shell. The steps are so designed that the shell faces are nearly parallel as they approach the point of nip, almost eliminating slippage and the resulting wear.



Oil engine which supplies power for operations.

According to Mr. Palmer, these plates have doubled the capacity of this crusher, and the plate life is lengthened considerably as there is no slippage of the material to cause rapid wear. After nearly a year's operation these plates were turned end for end, bringing the unworn sides to the front and doubling their life. This design Mr. Palmer recommends for crushing down to ¾ in. Some modification of the design would be necessary for finer crushing.

These operations have a capacity of 125 cu.yd. per hr., according to Mr. Palmer, when crushing to 1½-in. size and under and 100 cu.yd. per hr. when reducing to ¾-in. maximum. This is a remarkable record when it is considered that the material fed to the plant consists of only one-third sand and that the gravel runs up to 10 in. in size. Approximately 90 per cent. of the gravel is over ¾ in. and 70 per cent. is over 1½ in. in size.

Roads Report Does Not Favor Toll-Supported Superhighways

A SYSTEM of transcontinental super highways can not be supported by tolls and will not solve any considerable part of the problem of providing adequate highway facilities, according to a special report to Congress by the Chief of the Bureau of Public Roads of the Department of Agriculture. The report was transmitted to Congress by the President.

The report is made in accordance with the Act of June 8, 1938, instructing the Chief of the Bureau of Public Roads to investigate and report his findings "with respect to the feasibility of building, and cost of, superhighways not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads."

The report states that the building of such a system is entirely feasible from a physical standpoint but the system would not come with 50 per cent. of being self-supporting if operated as a toll facility. The report adds, however, that a system of toll roads such as the Bureau was required to report on does not meet the most urgent highway needs and presents a master plan designed to meet these needs.

In this plan five classes of improvement are listed. A bold attack on the congestion and delays on main arteries by constructing express highways through cities, belt-line distribution routes around them, and bypasses around small towns is proposed. It is also proposed to create a national system of interregional highways, approximately 27,000 mi. in extent, by modernizing and improving existing routes of travel and building new roads where necessary to provide more direct travel.

In studying the feasibility of a toll system, the Bureau selected six routes, located in accordance with the terms of the act aggregating 14,336 mi. Its detailed studies show that the cost of constructing this system for fast-moving traffic without crossing other highways or railroads at grade, would be about $2,899,800,000, which is at the average rate of $202,270 per mi.

The average estimated annual expenditure for the period 1945-60, required for financing the construction, maintaining the property and operating the facility would be $184,054,000, which is at the average rate of $12,840 per mi. per year.

Estimates of the potential traffic on the proposed toll system were based on actual traffic counts on the main highways of the country and studies of the character of highway travel. A number of facts led to the conclusion that only a small portion of present traffic could be attracted to the toll system. Long-distance travel constitutes only a small fraction of the total travel. Counts made on east-west highways at stations established on a line extending from Canada to Mexico showed only 300

passenger vehicles crossing the line daily in transcontinental travel. The system could be expected to serve adequately only that portion of the traffic having origin and destination close to one of the six routes. Access to the highways would have to be controlled both for collection of tolls and to prevent interference with flow of traffic by entering vehicles. Vehicles traveling distances less than the spacing of access points would not use the toll roads.

It is estimated that the utilization of the system would average, during the period 1945-50, 12,450,000 vehicle-miles per day. Assuming toll charges of 1 c. per vehicle-mile for passenger vehicles and an average of 3.5 c. per vehicle-mile for trucks and busses, this travel would produce an average annual revenue of $72,140,000. This is considerably less than the $184,054,000 estimated average annual cost and leads the Bureau to conclude that the system studied could not be supported by toll collections.

The portion of the proposed system estimated to be most nearly self-supporting is the 172 mi. from a point near Philadelphia, Pennsylvania, to a point near New Haven, Connecticut. With the increase in traffic expected by 1960, this portion of the system would earn slightly more than the estimated cost for that year.

The report states, "If, as an actual test of the feasibility of a limited mileage of toll roads, it is the desire of the Congress to make provision for the construction of a section of highway of substantial length upon which there is a reasonable prospect of the recovery of the costs through tolls, it is recommended that such provision be made applicable to a section of highway, properly located, and extending from an appropriate point near Washington, D. C. to an appropriate point near Boston, Mass."

The report recommends the construction of a special system of direct interregional highways, with all necessary connections through and around cities, designed to meet the requirements of the national defense in time of war and the needs of a growing peace-time traffic of longer range. A system of such roads, including 26,700 mi., has been tentatively selected on the basis of the detailed traffic data available. Existing main highways can be modernized to form a large part of the system but some new highways will be needed to provide directness of travel. Although these roads represent less than 1 per cent. of the total mileage of rural roads, the bureau estimates they would serve, when improved as indicated, at least 12.5 per cent. of the total rural vehicle mileage.

More complete information on the character of traffic in and near cities than has heretofore been available, is presented. Traffic maps in the report show that about 90 per cent. of the traffic on main highways near the entrances to large cities is bound to or from points in cities themselves and cannot be bypassed around them. It is found also that a large part of the traffic is destined to or bound from points in the very heart of the city or points most conveniently reached by going through the center of the city.

There is great need, the report indicates, for express highways cut directly into and through the center of the big cities. These are needed not only for service of the through traffic delivered by the main rural highways but also for the daily in-and-out movement of local traffic between the downtown section and suburbs centering about the main highways at the periphery of the city.

The West Side Highway and Henry Hudson Parkway in New York, and the recently constructed express highway in St. Louis, are cited as early examples of such facilities. The provision of similar facilities in Pittsburgh is now receiving serious consideration.

By preference such express highways should be constructed as attractively landscaped depressed thoroughfares passing under all cross streets.

Bypasses—the remedy usually proposed for the relief of congestion on through streets in cities—are said to be only a partial and, by themselves, a not very effective remedy. They are recommended around the smaller towns and a new type of belt-line distribution road around cities is proposed. For maximum effectiveness, both the bypass and distribution highways must be free of cross traffic, parked vehicles and developments immediately adjacent, to preserve their initial advantage against the encroaching growth of the urban community, which otherwise soon converts them into ordinary local streets.

Outside of city limits on the main highways the report shows there is need of modernization of the existing roads to ease curvature, reduce gradients, and extend sight distance in order more safely to serve fast-moving traffic. Near the cities, also, a steadily increasing mileage of four-lane divided highways is believed to be required.

According to the report, such improvements are required on most of the mileage of the Federal-aid and state-highway systems, especially those parts built before the recent considerable increase in the travel speed of motor vehicles. For the most part they involve only local changes in the existing roads. By such changes the bulk of the highway traffic that moves between adjacent cities will be amply served.

The report sketches the general outlines of a master plan for the improvement of roads and streets to meet the real needs of highway transportation. In addition to the several classes of improvements previously mentioned, the plan includes improvement of a carefully selected mileage of secondary and feeder roads to give direct service to a larger number of rural dwellers. The selection would be made from among the 2,650,000 mi. of roads outside of the state and Federal-aid systems. Constituting about 78 per cent. of the country's total road and street mileage, these lesser roads serve at present only about 10 per cent. of the total vehicle mileage of traffic. Located on them, however, are the homes and working places of about 75 per cent. of the rural population. The purpose of the improvement of an additional mileage of these roads, therefore, is shown to be that of affording better access to rural property rather than the service of a large increment of traffic. The choice of the roads to be improved should be made in close conformity with a program looking to the promotion of economically and socially beneficial land use.

The report discusses at length the limitations hitherto placed upon road improvement by difficulties of right-of-way acquisition, and shows that similar difficulties are now the principal obstacle standing in the way of needed improvements of the several types described, especially within and in the vicinity of cities.

Taking the city of Baltimore as an example of a universal condition, it shows, by spotting the location of properties on which the city holds tax liens and properties being acquired for Federal slum-clearance projects, that a wide belt of decadent property surrounds the central business section. Decay of values within this zone (the result of the outward movement of the homes of the more well-to-do citizens) is rapidly approaching a critical point. Creation of new values is beginning to occur, generally without regard to any well-conceived future street plan. In Baltimore, proposed slum clearance projects are shown to lie in the path of desirable express highway locations. All of which, says the report, indicates the great importance of early consideration of the new street plans which must form the framework upon which the cities of the future will be erected. It also indicates the need and present timeliness of effective measures for the acquisition of land in the cities, for future street developments and also for other kinds of public works and developments.

Some Trucking Employees Not Exempt from Hour Provisions

GENERAL Counsel Calvert Magruder, of the Wage and Hour Division, U. S. Department of Labor, has ruled that employees of private motor carriers and employees of common and contract carriers other than drivers are not exempt from hour provisions of the Fair Labor Standards Act. Such employees, of course, must be engaged in interstate commerce or in the production of goods for interstate commerce to be subject to the act at all.

Mr. Magruder's opinion was contained in an interpretative bulletin on the scope of an hours exemption provided in the act for employees "with respect to whom the Interstate Commerce Commission has power to establish qualifications and maximum hours of service pursuant to the provisions of section 204 of the Motor Carrier Act, 1935."

The opinion said that the scope of the Interstate Commerce Commission's power under section 204 had not been fully determined by the Commission. The opinion therefore is subject to revision if future action by the Commission so requires and merely indicates the course which Administrator Elmer F. Andrews of the Division will follow in performing his administrative duties, unless directed otherwise by the courts or unless the bulletin itself is later revised.

The Commission has already established maximum hours of service for drivers of motor vehicles operated by common and contract carriers (a standard 60-hr. week) and such drivers will be considered exempt from the maximum hours provisions of the Fair Labor Standards Act.

The full text of the interpretative bulletin follows:

1. Section 13 (b) (1) of the Act exempts certain employees of motor carriers from the maximum hour provisions of Section 7, as follows:

> "The provisions of section 7 shall not apply with respect to (1) any employee with respect to whom the Interstate Commerce Commission has power to establish qualifications and maximum hours of service pursuant to the provisions of section 204 of the Motor Carrier Act, 1935. . . . "

This section, it will be noted, provides no exemption from the minimum wage provisions of Section 6.

2. The scope of the exemption provided by Section 13 (b) (1) involves the interpretation not only of the Fair Labor Standards Act but also of Section 204 of the Motor Carrier Act, 1935. The scope of the power of the Interstate Commerce Commission under Section 204 has not been fully determined by the Commission and has not been passed upon by the courts. Opinions expressed at this time are, therefore, subject to revision if and when future action by the Interstate Commerce Commission so requires. This Bulletin is merely intended to indicate the course which the Administrator will follow in the performance of his administrative duties unless he is directed otherwise by the authoritative rulings of the courts or unless this Bulletin is revised in accordance with future action by the Interstate Commerce Commission.

3. Sections 204 (a) (1) and (2) of the Motor Carrier Act, 1935, place upon the Interstate Commerce Commission the duty to regulate common and contract carriers by motor vehicle and to that end authorize the Commission to "establish reasonable requirements with respect to . . . qualifications and maximum hours of service of employees, and safety of operation and equipment." In a proceeding styled "Ex parte No. MC-2" the Commission has established maximum hours of service for drivers of motor vehicles operated by common and contract carriers in interstate and foreign commerce. 3 MCC 665; 6 MCC 557. Such drivers will be considered exempt from the maximum hour provisions of the Fair Labor Standards Act by virtue of Section 13 (b) (1) thereof.

4. Sections 204, (a) (1) and (2) of the Motor Carrier Act, 1935, are not clear, however, as to whether the Commission has power to establish qualifications and maximum hours of service for employees of common and contract carriers other than drivers. Division 5 of the Commission has already indicated that the power of the Commission to regulate maximum hours of service is limited "to those employees whose functions in the operation of motor vehicles make such regulations desirable because of safety considerations." 3 MCC 665, 667. The report of the entire Commission in the same case expressed approval of this view. 6 MCC 557. The entire Commission, however, is presently engaged in a further investigation directed specifically to a determination of the question whether its jurisdiction is limited to employees "whose activities affect the safety of operation of motor vehicles." Ex parte No. MC-28. If the Commission determines that its jurisdiction is thus limited, a further hearing will be held to determine what, if any, employees other than drivers can be considered to be within the category of employees as to whom considerations of safety require a limitation of hours. Ex parte No. MC-28. Until an order of the Interstate Commerce Commission determines that employees of common and contract motor carriers other than drivers are within the power of the Commission under Sections 204 (a) (1) and (2), it is our opinion that the employees (other than drivers) of such carriers should be considered as not within the exemption provided by Section 13 (b) (1).

5. Section 204 (a) (3) of the Motor Carrier Act, 1935, places upon the Commission the duty "to establish for private carriers of property by motor vehicle, if need therefor is found, reasonable requirements to promote safety of operation, and to that end prescribe qualifications and maximum hours of service of employees, and standards of equipment." No qualifications or maximum hours of service for such employees of private motor carriers have as yet been established. The Commission is presently engaged in an investigation to determine the extent of its jurisdiction over employees of private motor carriers engaged in interstate or foreign commerce. Ex parte No. MC-3. In view of the words "if need therefor is found," it is doubtful whether the Commission can be considered as having "power" (within the meaning of Section 13 (b) (1) of the Fair Labor Standards Act) over employees of private carriers until it has made such a finding. In addition, it is impossible at this time to prognosticate what action the Commission will take. At least, therefore, until an order is issued by the Commission in this connection, it is our opinion that the employees of private carriers should be considered as not within the exemption provided by Section 13 (b) (1).

6. The wage and hour provisions of the Fair Labor Standards Act apply to employees engaged in interstate commerce *or* in the production of goods for interstate commerce. See Interpretative Bulletins Nos. 1 and 5. The Act is, therefore, broader in its coverage of employees engaged in connection with motor carrier transportation than is Section 204 of the Motor Carrier Act, 1935, which is limited to employees of carriers engaged in interstate or foreign commerce. Thus, the Fair Labor Standards Act applies to employees engaged in the transportation of persons or property by motor vehicle between places within a State where the transportation constitutes the production of goods for commerce, as the term "produced" is defined in Section 3 (j) of the Act, even though the goods have not yet entered into interstate commerce so as to subject the employees engaged in connection with their transportation to the jurisdiction of the Interstate Commerce Commission. Examples are (a) drivers transporting goods in and about a plant producing goods for commerce; (b) chauffeurs or drivers of company cars or busses transporting officers or employees from place to place in the course of their employment in an establishment which produces goods for commerce; (c) chauffeurs driving customers of a business producing goods for commerce; (d) drivers who transport goods from a producer's plant to the plant of a processor who, in turn, sells goods in interstate commerce, the first producer's goods being a part or ingredient of the second producer's goods; (e) drivers who transport goods from a factory to the plant of an independent contractor who performs operations on the goods and returns same by truck to the factory which further processes such goods for commerce. These and other employees engaged in connection with the transportation of persons or property by motor vehicle who are subject to the Fair Labor Standards Act because engaged in the production of goods for interstate commerce and who are not subject to the Motor Carrier Act, 1935, because not engaged in interstate or foreign commerce within the meaning of that Act, are not within the exemption provided by Section 13 (b) (1). Where for any other reason employees engaged in connection with motor transportation are not within the power of the Interstate Commerce Commission "to establish qualifications and maximum hours of service pursuant to the provisions of Section 204 of the Motor Carrier Act, 1935," such employees of the Interstate Commerce Commission unare not within the exemption provided by Section 13 (b) (1).

CHOOSING THE CORRECT TYPE OF ROPE

IT MAY seem hard to understand why a few wires, one way or another, make all the difference in the world in the way a wire rope performs. But it's just in the nature of the animal to be that way, and rope users who have an eye to costs are paying a lot of attention to the matter of buying ropes correctly.

Almost any rope, if it has sufficient breaking strength, will give some sort of service on almost any type of work. But the really fine results come only when the right rope is used. Much depends, of course, on the manner of use, but much also depends on proper rope selection.

This job of selecting a rope appears more difficult than it really is. For every grade and construction of rope was developed to meet specific needs, not merely to introduce variety. Every machine using wire rope can be made to operate to best advantage if it is reeved with just the kind of rope that "belongs" on that machine. Perhaps a brief discussion of some of the wire ropes in common use may help to show the possibilities of the various grades and constructions now available.

Most ropes are made with six strands. This number of strands has been found most suitable for supplying the operating characteristics required in the majority of cases. A 6-strand rope, to begin with, has sufficient pliability and "roundness" to satisfy most requirements. It contacts a sheave groove with enough of its outer surface to afford a good bearing for the rope and to assure that enough points of contact will be provided to prevent the abrasive action from being too concentrated on any exposed rope surfaces. Increasing the number of strands has the effect of increasing the "roundness" of the rope, of adding to the amount of metal that bears on any sheave or drum groove over which the rope runs. In general, an increase in the number of strands produces an increase in the amount of rope surface contacting a sheave or drum groove. At the same time an increase of the number of strands reduces wire sizes and diminishes the metallic cross-section of the rope, thus decreasing strength.

Metallic Areas.—Among the 6-strand ropes the 6 by 19 filler-wire construction presents the greatest amount of metallic area. Next in order are the 6 by 19 Warrington, the 6 by 19 Seale, the 6 by 7 and the 6 by 37. The strengths of these ropes vary, of course, in the same order.

An important advantage contributed by the greater "latitude" of the preformed rope is that it allows the employment of the usually more durable 6-strand construction in cases in which it would otherwise be necessary to employ ropes lacking the substantial advantages of the 6-strand rope.

Must Meet Many Factors of Use.—In considering rope constructions it must be borne in mind that no factor of use can be provided for to the exclusion of consideration of the other factors. When there is present a severe abrasive condition, there may also be other conditions requiring special rope qualities. These varying conditions of use are all taken into consideration in the mill recommendations furnished to rope users. Strict adherence to these recommendations will assure the user that he is providing properly for every feature of the job on which rope is used.

Advantages of the Various Constructions.—It may be helpful to preface a general discussion of the advantages and limitations of the various rope constructions with a brief statement of the more general characteristics of a number of "common" constructions with respect to their general efficiencies in meeting the conditions that usually most influence the service life of rope. Such a statement is contained in the accompanying graph (Fig. 1).

6 by 19 Filler-Wire the "Average" Rope.—A fact that stands out clearly from this graph is that the best rope for a desired balance between resistance to abrasion and bending fatigue is obtained by the use of the 6 by 19 filler-wire. For this reason we may say that this rope is pretty much the average of all the ropes in more common use.

Fig. 1. Chart showing the maximum and minimum resistances to abrasion and bending of various types of ropes.

Considering the various common constructions of wire rope in general use we may say that their characteristics are as follows:

6 by 19 Warrington.—In a Warrington rope, wires of four sizes are used. The principal application of the rope is for standard tool drilling, though it is frequently used for boom falls, casing lines, concrete mixers, deadlines, tackle blocks, slings and tubing lines. On the latter applications it has been largely supplanted by the 6 by 19 filler-wire construction.

6 by 19 Seale.—This rope (Fig. 2, a) is specified for operations in which greater resistance to abrasion and a more rugged rope body are desired. The outer wires are larger in size and are thus equipped to wear down more deeply before breaking than are the wires of the Warrington construction. It withstands crushing on the drum very well and also meets other severe service conditions successfully.

A Seale rope is not as flexible as a 6 by 19 Warrington or filler-wire. Seale ropes are used principally on draglines, car "spotters," crab winches, track lines on cableways, inclines, rotary drilling service, scrapers and winches.

6 by 19 Filler-Wire.—This very popular rope (Fig. 2, b) has over 6 by 19 Warrington and 6 by 19 Seale ropes the important advantage of greater flexibility and resistance to bending. It is used with good results on many machines equipped with rather small sheaves or drums and where abrasion has not too severe an effect on it. The principal applications are: shovel-hoists, boom falls, car retarders, car dumpers, derricks, elevators, grab buckets, shaft hoists, inclines, skip hoists, tackle blocks, winches, slings, trench hoes, locomotive cranes and mining machines.

6 by 16 Filler-Wire.—This rope (Fig. 2, c) is adaptable to applications in which it is desired to provide greater resistance to abrasion than there is in a 6 by 19 filler-wire rope and greater flexibility than can be secured with a 6 by 19 Seale rope. It is used largely for cargo falls, car haulages, drag-lines, inclines, slusher ropes and slop haulages.

6 by 19 Hemp Clad.—The 6 by 19 hemp-clad (or marlin-covered) rope is selected for operations in which men must handle the ropes continually. Hemp-clad ropes find their principal use as topping lifts or on grain shovels. The use of this rope for grain shovels is largely influenced by its ability to prevent sparking in an explosive atmosphere due to the presence of grain dust.

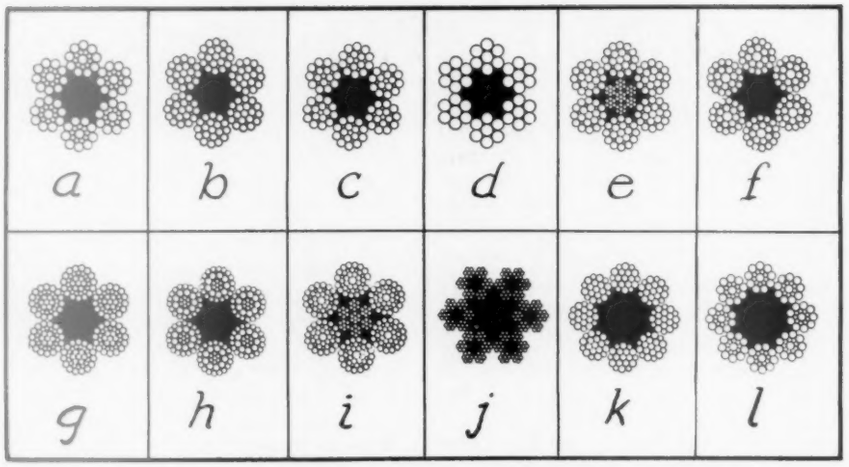


Fig. 2. Cross-sections of some of the types of wire ropes discussed in the text.

A 5 by 19 hemp-clad rope is also available. This is slightly stiffer than the 6 by 19 rope. It is used principally as a mooring line, and for rope drives.

6 by 7.—The large wires of which this rope (Fig. 2, d) is made give it great resistance to abrasion. At the same time they detract from the flexibility of the rope. This principal advantage and this principal limitation define the field of use as one in which the rope is likely to be greatly abraded and in which it encounters no sheaves and drums except those of very large diameter. The principal applications are in car haulage, mine slopes, transmission and for bailing lines, guys, standing rigging and torpedo lines. A 6 by 8 line, which has larger king wire and smaller outer wires in each strand, is also employed for cable tool drilling.

6 by 19 Armored.—A serving of flat annealed steel wire around each strand prevents abrasion from having an immediate effect on the strand wires themselves. The principal uses are on dredges and derricks equipped with grab buckets. This rope is more flexible than a 6 by 19 rope. The soft annealed armor wire soon becomes securely imbedded in all the strand voids and interstices, affording protection even when the armor is worn through at the crown. When preformed and equipped with an independent wire-rope center (Fig. 2, e) it is an excellent rope for use on Le Tourneau and similar equipment.

6 by 22 Filler-Wire.—This rope (Fig. 2, f) is similar to the 6 by 19 filler-wire and is used for certain of the applications in which the 6 by 19 filler-wire rope is employed, such uses as require greater flexibility and rather less resistance to abrasion. These uses include grab buckets, mining machines, dipper dredges and shovel hoists.

6 by 37 Seale.—A very flexible rope, this (Fig. 2, g) is used principally on grab buckets, mining machines, overhead cranes and shop cranes.

6 by 37 Filler-Wire.—This (Fig. 2, h) is a rope of great strength and flexibility used on overhead traveling cranes, as slings, and on coal towers.

6 by 41 Flexible Seale I.W.R.C.—This (Fig. 2, i) is another rope that is used as a hoist line on shovels and dipper dredges. They are rugged ropes of the so-called "flexible construction."

6 by 42 Tiller Rope.—A rope for use where the greatest degree of flexibility and comparatively little strength are required is the 6 by 42 filler (Fig. 2, j). This rope is actually six 6 by 7 hemp core ropes stranded together around another hemp core. It is used largely as a marine tiller rope and as an elevator hand rope.

8 by 19 Warrington.—This rope (Fig. 2, k) is used for steering-gear cable, pavers and mixers. Like all 8-strand ropes, it has good flexibility but is unsuited to conditions which may involve crushing on the winding drum.

8 by 19 Seale.—Where a greater degree of abrasion is encountered, the 8 by 19 Seale (Fig. 2, l) construction is employed. This rope is used mostly on elevators and occasionally for cargo falls. In elevator work there sometimes arises controversy over the relative merits of 8-strand and 6-strand cables. The evidence appears to favor the 6-strand rope for general elevator applications.

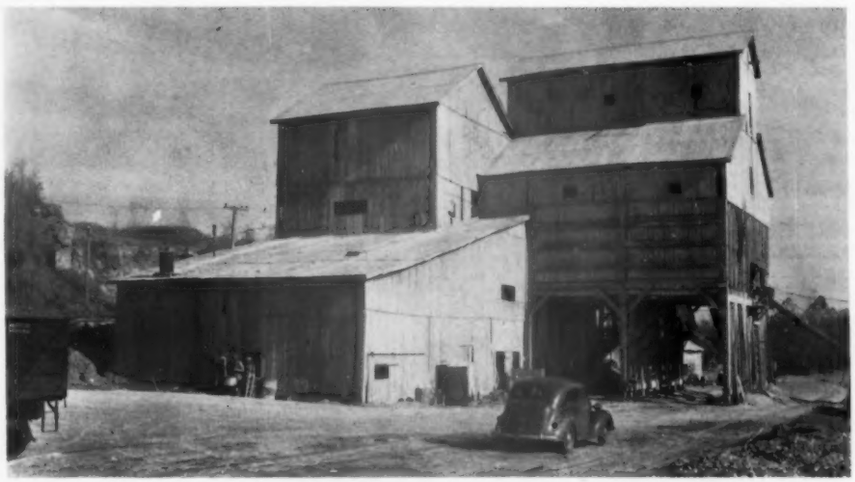
How Preforming Helps Performance.—Most of the ropes that have been discussed give better results when they are preformed. In general preforming adds largely to the ability of the rope to withstand the effects of constant bending. The more action the line is subjected to, the greater the need to employ a preformed rope. In certain services, such as boom lines, non-preformed ropes are used because of their relative inactivity in service. On machines that call for continual action of the boom lines preformed wire rope should be specified.

Many of the rope applications to which reference is made are handled to best advantage by Lang-lay lines. This is particularly true when the ropes must encounter small sheaves or a heavy abrasive action. Ropes with independent wire-rope centers are specified when protection against crushing is necessary. Lang-lay ropes and ropes with independent wire-rope centers should be preformed.

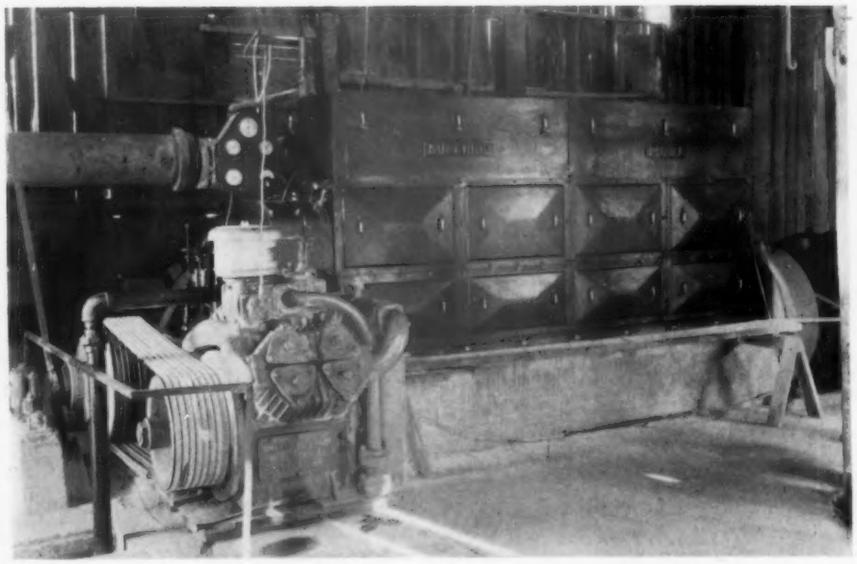
A Koehring shovel loading the hopper of a portable crushing plant being operated by the P. W. Ryan Sons Co. of Janesville, Wis.

FROM STEAM TO ELECTRICITY TO DIESEL

By W. E. TRAUFFER



Plant of the Charles Stone Co. Power-house in foreground.



The 360-hp. Diesel engine. Compressor at left, generator at right.

Workman repairing a truck wheel with the electric-arc welder.

AMONG the many nonmetallic-minerals producers who have in recent years adopted Diesel power to operate their plants is the Charles Stone Co. at Cypress, Ill. The high cost of purchased power and, particularly, excessive demand charges were the reasons for this change.

The company's plant is 25 years old and since 1923 it has been a subsidiary of the Yourtee-Roberts Sand Co., Chester, Ill. Comparatively few improvements have been made in recent years. Until 1938 stone had been loaded by hand in the quarry. A 1-cu. yd. Northwest gasoline shovel now loads to four International dump trucks which dump the stone into a skip car which is hauled up an incline to the plant. It is planned to convert this shovel to Diesel operation.

The plant was originally operated by steam and was converted to electrical operation in 1928. A 150-hp. motor drove a lineshaft, from which all the plant equipment was driven. Another 50-hp. electric motor operated a compressor. In April, 1938 a National Superior 360-hp., 6-cyl. Diesel engine was installed to operate all the above equipment and a ¾-cu. yd. Thew shovel, as well as several pumps. This shovel is used for stripping and stock-piling.

When operating two shifts daily the power bill was formerly between $1,300 and $1,400 monthly. During slack periods demand charges made the power costs run as high as $600 for only four days of operation in a month. Under the same operating conditions, according to J. B. Willebrand, superintendent, the Diesel engine costs only $1.00 per hr., or about $500 per month in operating and maintenance expense. Under full load this engine uses only 10 gal. of 6 c. fuel oil per hr. and the lubricating oil cost is 20 c. per hr. including a change every 250 hr. Shell 32-36 gravity Dieseline and Shell lubricating oils are used.

The engine is the Type UDMB with 9-in. bore and 12-in. stroke and operates at 600 r.p.m. It is equipped with a Reliance tachometer, an Alnor selective exhaust temperature indicator, a fuel-pressure gage, a starting air-pressure gage, and a water-temperature thermometer. An Ideal switchboard, with voltmeters, ammeters, etc., controls the power out-put.

From its front end the engine drives an Ingersoll-Rand Type 40 air-cooled, 6-cyl. compressor, which supplies air for the quarry drills. This is driven through Dayton Cog Belts from a shaft

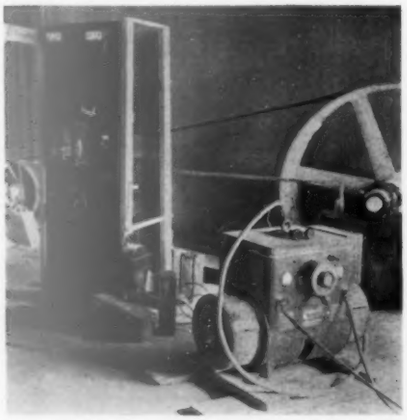
which is connected to the engine by a flexible coupling and a clutch and is supported on two Dodge Timken bearings.

At its drive end the engine is connected through V-belts with an Ideal 5-kw. 125-v. 40-amp. exciter and two Deming cooling-water pumps. A 150-kw. Ideal 480-v., 226-amp. alternator is driven direct from the engine driveshaft. This generator supplies power for a 3-hp. deep-well pump motor, a 5-hp. elevator motor, a 100-hp. motor driving a No. 1 Williams pulverizer

One of the hammermills with elevator and bin for loading agstone into trucks.

and an elevator, a 10-hp. quarry drainage-pump motor, a 7½-hp. hoist motor, the 25-hp. motor in the Thew electric shovel and a 7½-hp. shop motor. This generator also supplies current for lights through a transformer and occasionally for a Hobart arc-welder, which has a 20-hp. motor.

Beyond the alternator the drive-shaft has a clutch and pulley, and a flat belt drives the lineshaft from which the remainder of the plant equipment is driven. This shaft had previously been used for steam and electric operation. It is 70 ft. long and has eleven plain



The electric-arc welder and the generator control board.

bearings and six pulleys. Flat belts are used to drive the incline hoist, the Allis-Chalmers No. 7½ primary crusher, the 5-ft. by 16-ft. revolving scalping screen, the 4-ft. by 16-ft. revolving sizing screen, an 80-ft. bucket-elevator, the Allis-Chalmers No. 5 secondary gyratory crusher, and the No. 4 Williams pulverizer.

The total load when the plant is in full operation exceeds the rated horsepower of the engine but, according to Mr. Willebrand, this has caused no trouble. The plant operated two shifts daily during most of 1938. The plant capacity, when producing material from 2 in. size down, with a high proportion of agricultural limestone, is 60 tons per hr.

Insulating Materials Sales Show Decline

The tremendous growth of the home-insulation industry that sprang up in the midst of the depression of the early 1930's seems to have been checked, at least temporarily. Sales of vermiculite were off perceptibly, Bureau of Mines' reports showing shipments of only 20,569 short tons valued at $191,951 in 1938 compared with 26,556 tons valued at $260,664 (revised figures) in 1937 and 16,933 tons worth $185,787 in 1936. Statistics for other kinds of house-fill materials are not available, but sales of mineral wool seem to have declined at least 20 per cent. New rock-wool plants were built in various states, and capacity of many of the older plants was increased; yet the aggregate tonnage undoubtedly declined.

Architects generally anticipate that a larger and larger proportion of new homes will be insulated hence further recovery in residential construction should bring about increased sales of insulation materials. The trend in consumption for modernizing existing homes is less easy to forecast. In past years protection of these older homes accounted for a substantial percentage of the current consumption of expanded vermiculite and mineral wool. Owing to the general recession in 1938, many home owners postponed expenditures for all but the most necessary current repairs. As their purchasing power improves, they are likely again to demand the comfort and economy that proper insulation has demonstrated that it can give. For these reasons the Bureau of Mines does not seek to discourage further investments in new plants, but it does point to the plain warning that mushroom growth cannot go on indefinitely in any industry, and that supplies of suitable raw materials represent only one factor favorable to a proposed enterprise. More important in most localities is the existence of a reasonably permanent and regular demand for the product. It is not enough to show a profit on sales during the first year, and as the demand for modernizing existing homes approaches saturation, sales are more and more dependent on new construction. Already in this country there are at least 60 companies producing mineral wool in 70 or more plants. Capacity is estimated at fully 600,000 tons a year and sales in 1938 did not exceed 400,000 tons, probably less. It is estimated that this demand at present is about evenly divided among the three principal products—nodulated wool, loose wool, and batts. Inasmuch as much of the wool applied to existing dwellings has to be blown into the walls or roofs, shipments of nodulated (granulated) wool afford a rough index of the relative importance of this branch of the business.

An outstanding development in the vermiculite industry in 1938 has been the progress in the utilization of smaller sizes. In Minneapolis, which has long been a leading market and where three expanding plants are now producing house-fill, important sales of vermiculite plasters have been made recently. The vermiculite replaces fiber and part of the sand and the product has good heat- and sound-insulating properties. Of special interest is its use in school buildings to prevent transmission of noise by the steel framework. The fire resistance of such plasters is superior to that of those made from larger pellets of vermiculite as these sometimes expanded further when strongly heated, thereby causing cracks. Hitherto, sizes smaller than those used for loose house-fill (minus 3 plus 14 mesh) have been difficult to dispose of, often being thrown away at the mines, but other new uses for finer sizes are developing in conjunction with fire clay and bentonite for special refractories, including combustion chambers for oil-burner equipment. Visitors to the San Francisco World's Fair will see expanded vermiculite sparkling in walls of the buildings. To impart a distinctive finish to the 200,000 square yards of exterior stucco, 140 tons of vermiculite, specially heat treated to a bright golden color, was applied while the cement stucco was still wet.

In 1938, raw vermiculite was produced commercially in the United States by two companies in Montana, and one each in Colorado and Wyoming. Another concern made trial shipments from North Carolina. Although the mining companies all sell cleaned raw vermiculite, most of them have acquired one or more expanding plants so as to be able to sell their product more directly to the consumer.

BASIC PROBLEMS OF NATIONAL ECONOMY

By EDWIN M. MARTIN

THE Temporary National Economic Committee [1] which held its first public session on December 1, 1938, is in vital respects a group without precedent in American history. The Presidential message suggesting it and the Congressional resolution creating it [2] recognized the unusual nature and seriousness of the obstacles that have interfered in recent years with the adequate functioning of the national economy. This condition is apparent in the inadequate employment of both workers and productive resources, and in the gravely depressed standards of living of large parts of the population, both rural and urban. The seriousness of the problem found reflection in the composition and duties of the Temporary National Economic Committee. Its members represent both Houses of Congress and six executive agencies. Its duties include a thorough study of the national economy for the purpose of ascertaining the main causes of its inadequate functioning and making recommendations with respect to legislation.

The public hearings of the commitee were opened on December 1 by one of the members of the committee, Isador Lubin, Commissioner of Labor Statistics. During the first three days he shared with Willard Thorp, director of studies for the committee in the Department of Commerce and economist for Dun and Bradstreet, and with Leon Henderson, executive secretary of the committee, responsibility for presenting a factual introduction to the committee's work. They described the failure of the national economy in recent years to produce enough goods for the American people, and surveyed the preplexing problems which must be solved if the standard of living is to be permanently raised. This article summarizes their testimony.[3]

The Year 1929 a Turning Point.—Up to 1929 the output of the American economic system, as measured by the national income, had increased for eighty years without serious interruption (Chart I). The physical volume of the output of factories and mines increased five-fold from 1870 to 1900. From 1899 to 1929 it tripled (Chart II). During these years the population was increasing rapidly, too, but not so fast as output. Two and one-half times as much was produced *per person* on the average in 1900 as in 1870, twice as much in 1929 as in 1900. Occasional set-backs were always brief and previous records were soon broken.

Since 1929, however, the picture has been different. In 1932 the per capita volume of industrial production was at the level of 1899—33 years lost. By 1938 it is estimated that it had risen only to the 1905 level. For nine years the output has failed to equal earlier achievements. Despite the continued growth of population, with more people to house and clothe and feed, industry has in no year turned out as much as it did in the late twenties. The consequences of this reversal of trend since 1929 have been felt by all classes of people: workers and farmers and investors, business men, large and small.

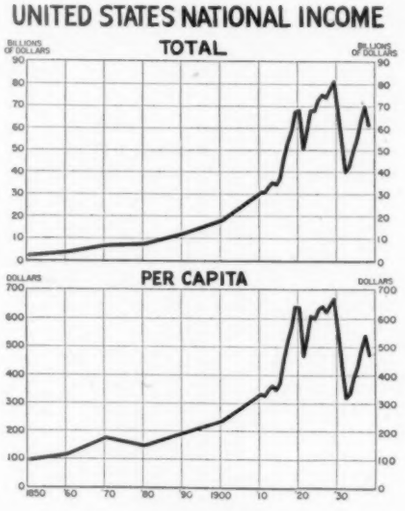


Chart I—National income.

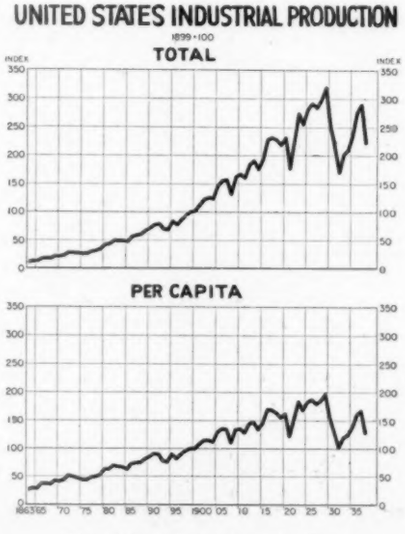


Chart II—Industrial production.

Importance of Durable Goods in the Depression.—A detailed examination of the production records of the leading American industries during the past nine years reveals important variations among them. The sharpest declines after 1929 were in industries producing long-lived, durable goods, such as steel, machinery, automobiles, lumber, cement, goods whose importance in the economy has increased substantially in the last fifty years.

The construction industry followed the general trend of output of the durable-goods industries, but in addition had some special characteristics of its own. The peak of residential construction, for example, was reached in 1925, when 937,000 dwelling units were built. By 1933 the number of new residential units built annually had fallen to the almost incredibly low figure of 54,000. Although the volume of building increased substantially after 1933, in 1937 it was still far below previous levels.

On the other hand, the output of nondurable products, such as cotton textiles, shoes, and cigarettes, not only did not fall so low in 1932, but by 1937 was larger than in any previous year, even 1929.

Employment.—The declines in employment in manufacturing, in mining, and on the railroads during the past nine years represent, in part at least, more than a depression problem. From 1923 to 1929, despite a substantial expansion of output, the number of wage earners and the total number of man-hours worked in these industries declined. Fewer workers produced more goods and services. From 1909 to 1936 the output per man-hour in anthracite and bituminous-coal mining almost doubled; in manufacturing it more than doubled.

This increased productivity is in part the basis of the rise in average real weekly earnings in these industries. The real weekly earnings (cash earn-

[1] Frequently, although incorrectly, called the "Monopoly Investigating Committee."

[2] The committee was suggested by the President in a message on April 29, 1938, and was authorized by Public Resolution No. 113, 75th Congress, 3rd sess. The resolution was approved June 16, 1938. The committee's composition is as follows: "(1) three members of the Senate, to be appointed by the President of the Senate; (2) three members of the House of Representatives, to be appointed by the Speaker of the House of Representatives; and (3) one representative from each of the following departments and agencies, to be designated by the respective heads thereof: Department of Justice, Department of the Treasury, Department of Labor, Department of Commerce, the Securities and Exchange Commission, and the Federal Trade Commission."

[3] In general, Mr. Lubin was responsible for the facts summarized in the first section of this article, Mr. Thorp for those in section 2, and Mr. Henderson for the problems suggested in section 3.

ings adjusted to cost of living) of their employees were higher as a group in 1937 than in any previous year, although millions of workers were seeking jobs at that time.

Needs of Consumers Call for Greater Production.—It is clear that during the past nine years American industry has failed to use efficiently its vast resources of men and machines. If its capacity is to be used to the full, wider markets for its products must be found. The necessary expansion can only take place by meeting more adequately the needs of the millions of low-income families. Even small increases in the incomes of these people would add vastly to the demand for the products of industry.

Suppose, for example, that the incomes of the 5,200,000 wage-earner families who had incomes of $1,250 or less in 1935, and yet received no relief assistance, could be raised to $1,500 each per year. This would require an increase of a little over $2 per working day for each family. It is estimated that these families would then spend about $800,000,000 more for food, $416,000,000 more for clothing, $613,000,000 more for housing, $213,000,000 more for fuel, light, and refrigeration, $385,000,000 more for automobile and other transportation, $73,000,000 more for personal care, $234,000,000 more for recreation, and $208,000,000 more for medical care.

Their need for more goods is obvious. Vast productive resources of men and machines are idle. How can these untapped home markets be vitalized so that the needs of consumers will be turned into the effective demand required to stimulate production and employment? That is the basic problem faced by the Temporary National Economic Committee.

The American Business System.—A sound approach to the solution of this problem calls, among other things, for a thorough knowledge of the structure of the American productive and distributive system, and of the varied and complex problems with which the individual business men who operate the system are continually struggling. A general expansion of production and consumption depends in large part on the solution of their widely varied problems—problems, today, primarily of distribution, determining prices, and finding buyers, rather than of organizing production. And on this expansion depends the maintenance of what is known as the "American business system."

Business Population.—According to the records of Dun and Bradstreet there are over 2,000,000 firms in business in the United States. The total number changes relatively slowly, but there is a rapid turn-over in the individual units of which the total is composed. It is estimated that, in 1937, 400,000 new businesses were started and 351,000 discontinued operations (Chart III).

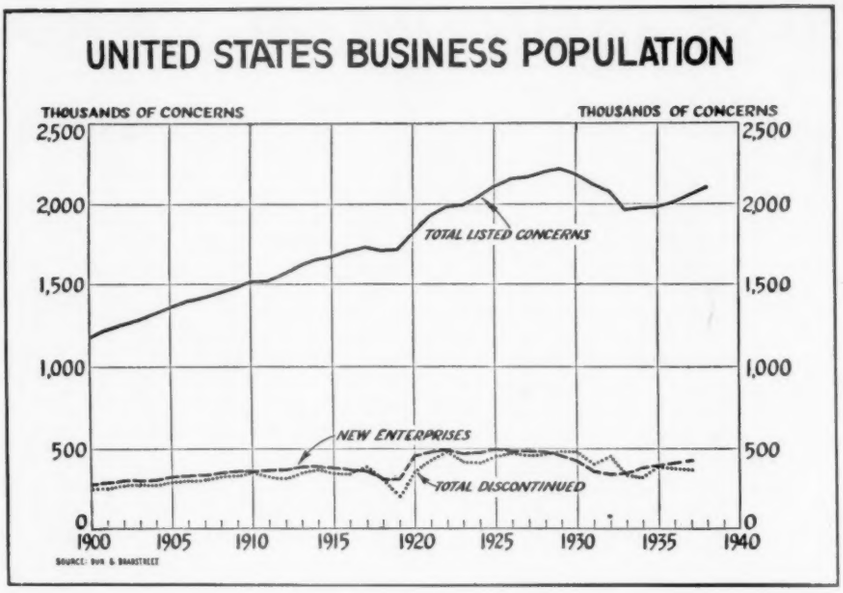


Chart III—Business population.

There must be a substantial freedom of opportunity as well as an enormous fund of optimism in a business system in which 400,000 new enterprises are started in one year. In certain fields of activity, however, a number of factors often act as barriers to the starting of new businesses. Necessary natural resources may be controlled by existing companies; basic patents may be held on terms which prevent their use by potential competitors; markets may be so dominated by existing firms that a new competitor must force his way in against almost insuperable odds; or the very nature of the business may require such a large capital investment as to make a new venture extraordinarily difficult and hazardous.

Large and Small Business.—No measure of size is entirely satisfactory. Measured by the number of employees over half of the 1,700,000 concerns covered by the old-age insurance section of the Social Security Act did not have more than three employees in the last half of 1937. On the other hand, 195 enterprises each had over 10,000 employees; together they had 12 per cent. of the employees covered by the act.

Measured by the value of their assets, over half of the corporations reporting to the Bureau of Internal Revenue had assets of less than $50,000 each in 1935, but they had only 1.4 per cent. of all corporate assets. At the other end of the scale, one-fifth of 1 per cent. of the corporations, each with assets of over $50,000,000 had more than half of all corporate assets.

The great size and influence of big business enterprises have given them outstanding importance. Two characteristics of these industrial giants deserve special attention.

In the first place, with few exceptions, they have grown up in groups or clusters. Few industries are dominated by a single giant company; rather, several big firms are to be found competing with each other.

Secondly, the larger organizations have reached their present size by expanding in various directions and for various reasons. Their points of difference are as striking as their similarities. Occasionally the conglomeration of activities carried on by a single company appears to be the result of pure chance; for some products modern methods of mass production have required vast capital investments; effective distribution in a national market is increasingly dependent upon national advertising campaigns which only large firms can finance; some companies have expanded as the best way to invest their surplus earnings; and many mergers have been cradled in the offices of investment bankers looking for securities to sell to the public.

Size Distinguished from Concentration.—For many purposes it is essential to distinguish between concentration and size. As often as not they do not go together. Concentration is a measure of the control exercised by either the buyer or seller in the market for a particular product. Hence it is the more important measure in any study of the effectiveness of competition in controlling prices.

Even a limited survey of a number of products with national markets for which concentration data are available

indicates wide variations in the degree of concentration. In 1935 the two largest manufacturers of plate glass produced 95 per cent. of the total output; in the same year the four largest concerns in the women's clothing industry were responsible for only 2 per cent. of the total output.

Even a high degree of concentration in the market for a product may be of relatively small importance because of vigorous competition from other products. For example, coal must compete more or less directly with natural gas, petroleum products, and water power. Cotton products must compete with goods made of wool, silk, and rayon.

Effective concentration may be brought about for certain purposes by various devices falling short of single ownership. Interlocking directorates are frequent channels for coöperative attempts at market control. Retail stores have endeavored to meet the competition of chains by forming voluntary coöperative organizations which concentrate their buying power while leaving the merchandising decentralized. Nearly 8,000 trade associations, 1,800 of them national in scope, provide the most common example of the effort to meet certain industry needs through coöperative action short of merger. Lastly, there are at any time an unknown number of illegal combinations or agreements between competitors in violation of existing statutes.

Problems of the Business Man.—In operating this complex structure business men are faced with two sorts of problems. There are, first, the broad problems common to nearly all industries and hence nearly all business men, such as technological changes, wars and threats of wars, the fluctuations of the business cycle, foreign competition, and changes in governmental policies.

Probably of equal importance to the individual business man, but far less widely recognized by the general public, is the infinite variety of problems involved in his relations with the rest of his industry. They are so numerous and differ so widely from industry to industry that no summary description of them is possible. The complexity of the problems faced in the different industries, and even in different segments of the same industry, can hardly be over-emphasized.

Next Steps.—One can not fail to be impressed with the delicate powers of adjustment to changing problems and changing situations which the American economic system must possess to survive at all. Increasing specialization and increasing interdependence have multiplied the complexity of the system. But survival is not enough; ways must be found to operate this delicate mechanism more effectively.

Any approach to this task must start with a recognition of recent changes in the historic conditions and forces on which the vitality of the American business system depends. Changed conditions must be accepted as requiring changed methods.

Among the changed conditions of which account must be taken in considering measures to increase production and consumption are the sharply declining rate of population increase; the disappearance of the frontier; the decline in the intensity of competition accompanied by such controls over selling practices as the Robinson-Patman and Miller-Tydings Acts; the increased interference on an international scale with foreign trade; and a changing attitude toward the responsibilities of government for the economic well-being of the population.

The adaptation of enterprise to these changed and changing conditions in such ways as to expand output and consumption will require answers to many difficult questions. Some typical questions are these:

What is the present status of competition? Is the lack of self-adjustment of the economy due, wholly or in part, to a decline of competition? If so, what changes are necessary in public and private policy to make competition effective? Is the choice necessarily between full competition and full planning?

In what particulars are the anti-trust laws inadequate? What effects have patents had upon the expansion of production? Has new investment lagged? What is the proper function of government in a period of under-investment?

Are our liberties endangered by the growth of private controls? Is there a relation between collectivism in private industry and collectivism in government? How can the dignity and importance of the individual be enhanced by choices of economic policies?

In approaching these and related problems, the Temporary National Economic Committee appreciates the complexity of the national economy, its long historical background, and the interdependence of its various parts. Innovations must recognize the deeply-rooted, organic nature of our economic institutions. Careful examination of the facts and conscientious effort to understand the system as a whole must precede any conclusions regarding remedies. But somehow more must be produced; more must be available to increase the American standard of living. The unprecedented nature and gravity of many of the problems now confronting the nation call above all for open-mindedness toward possible solutions of our problems.

Crushed Ice to Cool Concrete in Germany

Several years ago, engineers were quite interested in the method of refrigeration used by the contractors of the Boulder Dam to cool that great concrete structure so as to prevent the setting up of internal stresses and the formation of cracks. In massive structures of this kind, these stresses are attributable to temperature changes, the greatest of which occur while the concrete is in the initial stages of setting.

Before work on the Boulder Dam was started, it was determined by the U. S. Bureau of Reclamation that the average temperature rise from this cause would be about 40 deg. F., and that 38,600 B.t.u.'s would have to be extracted for every cu. yd. of concrete placed so as to reduce the temperature of the mass to a safe point. Cooling was done progressively as the structure was poured by first circulating river water and then refrigerated water through small-diameter pipes embedded in the concrete.

Now Germany is proposing to achieve the same end in a different and what seems to be a simpler way. The first application of the new method is to be made in the case of what will be, it is said, the biggest dam in the country. It forms part of a large hydro-electric project in the Harz Mountains involving the rearing of seven dams. The structure will be 328 ft. high and 1,312 ft. long at the crest. To cool the concrete, the engineers have decided to use finely-ground ice instead of water for mixing the cement and aggregates. This, it is computed, will give the concrete an initial temperature of from 37.5 to 41 deg. F., or about 35.5 deg. less than that of the surrrounding atmosphere. This will be low enough to prevent a critical rise in temperature—that is, dangerous internal stresses—as a result of the heat developed in the concrete through hydration during the initial period of setting.

Enormous quantities of ice will, of course, be required, and this is to be manufactured at the point of use by a refrigerating plant. In this respect, the new system does not differ from that used at Boulder Dam, where a large ammonia-compressor plant was built to provide the necessary cooling water. The German plan, however, seems to be an improvement, as it eliminates the intricate network of piping which, in the case of Boulder Dam, had an aggregate length of 662 mi. It now serves as reinforcing.

By W. E. TRAUFFER

LEFT—A view from the hill showing the storage silos and part of the plant of the Vermont Asbestos Mines.

VERMONT ASBESTOS ADDS IMPROVEMENTS

AN article was published in the December, 1936 issue of PIT AND QUARRY which described the operations of the Vermont Production Co., now the Vermont Asbestos Mines, at Eden, Vt. This company, a division of the Ruberoid Co., operates the only non-spinning, short fiber, chrysotile asbestos plant in this country. So many improvements have been made in plant operations and equipment since this article appeared that the writer recently again visited this plant. These improvements have been responsible for a considerable improvement in the product.

In the open quarry the former method of loading overburden by hand into horse-drawn pans has been abandoned. Stripping is now being done with a Holcomb-Westy 1-cu.yd. scraper operated by a Lidgerwood gasoline hoist which can easily be moved around as needed. Hydraulicking of the overburden has also been attempted but this is not practical except in the spring because the water supply is inadequate at other times.

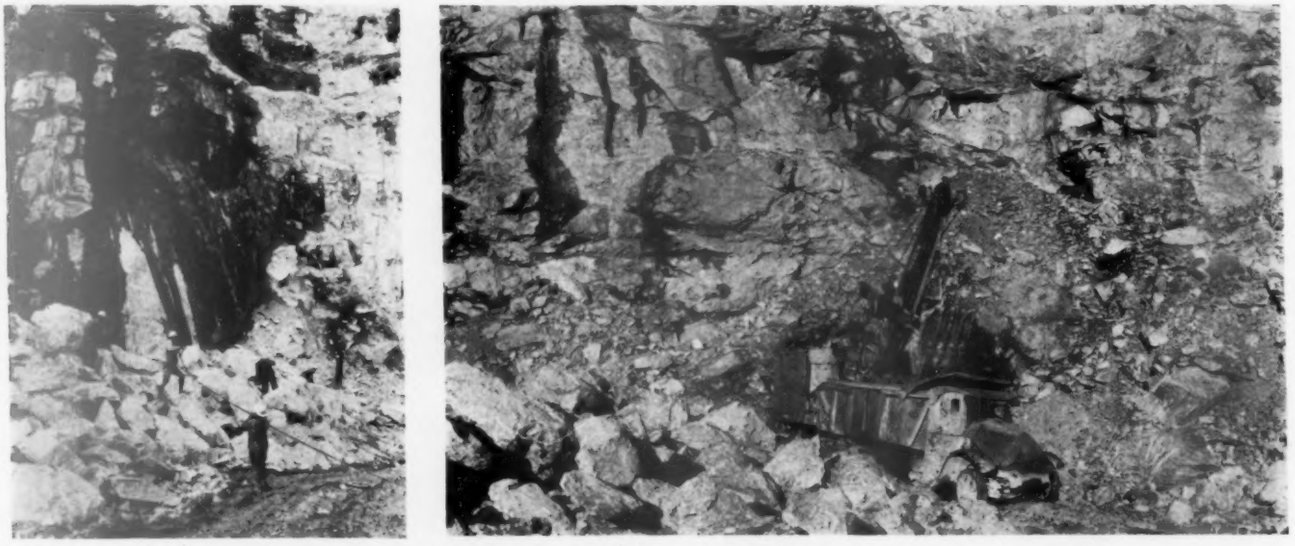
The quarry has been enlarged considerably since the last writing and concrete roads have been built for the quarry trucks. These are extended as the quarry is developed and have accelerated and lowered the cost of hauling to the plant. These roads are poured in 50 to 60-ft. sections about 8 times during the year. This is done over week-ends in order to prevent delays to the operations.

The drilling and blasting methods have not been changed. The 150-ft. face is shot down in benches, the drilling being done with jack-hammers. The quality of the raw rock hauled to the plant has been improved by utilizing the Canadian practice of discarding rock which does not give a high yield of asbestos fiber. As the quarry developed, a longer and better grade of fiber has been encountered. The quarry capacity, due to these improved methods, is now 100 tons per hr., compared to about 50 tons two years ago.

Safety work is given considerable attention and all the miners wear hard-toed safety shoes and M.S.A. hard hats which are furnished by the company.

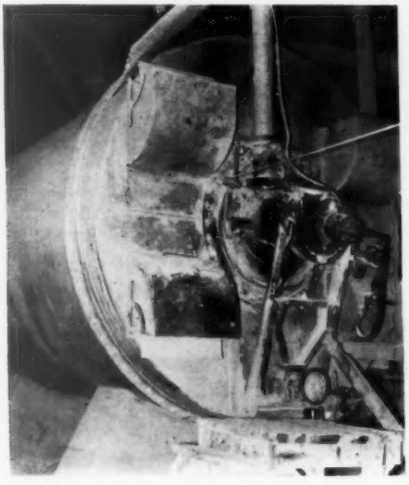
Two Marion 1¾-cu.yd. electric shovels load the same three Mack 10-ton rear-dump trucks. The rock is discharged into a Traylor 28-in. by 36-in. jaw crusher. A 4¼-ft. Symons cone crusher was installed in October, 1937 to replace the original secondary crusher. This is preceded by a new 4-ft. by 10-ft. Tyler Niagara single-deck screen used as a scalper. The products of both machines are combined and follow the same flow to the 1,000-ton wet-rock storage bin.

Material from this bin is discharged into a hopper feeding three conveyors



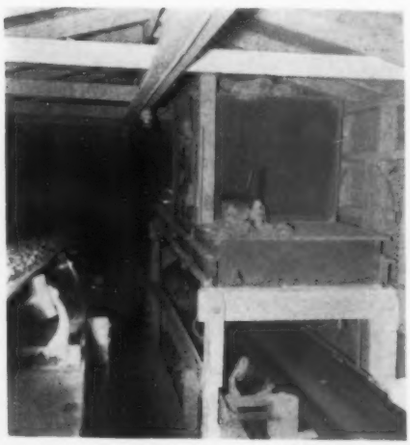
Two views of quarry operations. At the left drillers are at work, the men wearing safety hats and shoes. At the right a shovel is loading into one of the trucks.

Feed end of drier with draft fan immediately above which feeds to the cyclone.



Discharge end of the new 80-in. by 60-ft. rotary drier, showing the oil burner.

to the one oil-fired and two coke-fired rotary driers, which can be operated singly or in any combination. The two original 4½-ft. by 40-ft. driers have have been supplemented by a new 80-in. by 60-ft. direct-fired Hardinge Ruggles-Coles drier installed late in 1937. This drier is equipped with lifters, discharging the heat into the drier through a specially designed fire-brick-lined duct in a manner protecting the charging chute of the drier. The drier is oil-fired employing Bunker "C" grade fuel oil. The fuel is fired into the combustion chamber through a W. N. Best Engineering Co. "Calorex" Model 300 industrial rotary-cup, low-pressure, air-atomizing type burner. Through special characteristics of this burner with its wide range of firing



Automatic-weighing device on belt-conveyor carrying rock to storage silos. At the left is the conveyor which reclaims from the silos.

rate satisfactory dehydration of the asbestos rock is obtained at all moisture and temperature levels. A cyclone reclaims the fiber from the draft-fan exhaust and this, with the drier product, is discharged on a common conveyor with the product of the other driers.

The final reduction unit is a 5½-ft. Symons cone crusher. The former trommel scalper preceding this crusher has been replaced by a Tyler Niagara vibrating screen. The former storage bin has been replaced by two Nicholson 5,000-ton concrete storage silos each 90-ft. high. A belt-conveyor carries the dried rock over a Merrick Weightometer which records the amount stored. A bucket-elevator feeds the rocks to a belt-conveyor which discharges into either of the silos. Material is reclaimed from storage through special hoppers with gates which discharge it on a belt-conveyor. A second belt-conveyor to the mill has another Merrick Weightometer for recording the amount of material handled. This entire storage and handling system was completed early in the fall of 1938.

The milling methods have not been changed but additional equipment has been installed to increase the capacity. The crushed asbesto-bearing rock is first passed through Jumbo fiberizers which separate the asbestos fiber from the rock matrix. Shaking tables then screen out the fine sand and the fiber is picked up by air suction into collectors. The oversize material passing the suction hoods is discharged into a second series of fiberizers to insure the maximum amount of recovery. The fibers picked up by the collectors are further screened, passed through dust removers and graders, and dropped into bins according to their length. The finished product is loaded through spouts into 100-lb. bags.

The waste material is carried on a series of belt-conveyors now 500 ft. long to a dump on the hill below the plant. The sacked asbestos is hauled in trucks to the railhead at Morrisville and Hyde Park, Vt., where it is stored in warehouses or loaded direct into cars for shipment. Four International trucks purchased late in 1937 are used for this purpose and each makes 8 round trips daily.

Another improvement was the addition of two oil-fired Erie City "Economic" boilers to heat the oil and supply steam pressure. This Bunker C oil used as fuel is received in tank-cars and is stored at Hyde Park in a 15,000-gal. tank. Each of the fiber trucks has a 275-gal. tank under its body and hauls oil to the plant on its return trips. Storage at the plant consists of two 30,000 gal. tanks.

Payments for Overtime Must be in Cash

Payments for overtime must be paid in cash and at the time when an employee customarily receives his compensation, Wage-and-Hour Administrator Elmer F. Andrews has declared.

"The Act requires," the Administrator said, "that the employee 'receive compensation' for overtime at one and one-half times his regular rate of pay. This means money, not time. We have expressed the opinion that payment of overtime compensation must be made within a 'reasonable time' after it has been earned. Such 'reasonable time' will normally coincide with the pay period and, in our opinion, the circumstances would be most unusual when this is not the case. This interpretation accords with the practical necessities of administration.

"Any other practice would permit the deferment of payments for overtime to such an extent that the plain purpose of the Act would be defeated. Under an amendment to the Fair Labor Standards Act now being considered by the House Labor Committee, the Administrator would be given authority to approve 'constant wage plans' by which the deferment of payment of overtime would be authorized, and could be safeguarded and regulated. But unless Congress grants that authority an employer would not be justified in failing to pay for overtime at the time when the employee customarily receives his compensation."

With reference to the general question of time off, the Administrator added that within a given pay period—for example, when an employee is customarily paid fortnightly or monthly—it is possible that the amount due an employee for overtime earned in one week could be compensated for in another week or weeks within such pay period by giving the employee time off in such week or weeks and yet an amount in wages therein equal to what he would have received if he had worked a full workweek. This could only be done, of course, where the employee had a regular fixed hourly rate of pay.

Gain in Phosphate-Rock Production Predicted for Next Ten Years

BELIEF that the domestic production of phosphate rock will reach 5,400,000 tons annually within the next decade is expressed in the report of a study of technology, employment and output per man in the industry recently conducted by the Works Progress Administration in coöperation with the Bureau of Mines of the Department of the Interior. The study, one of many undertaken by the W.P.A. under the National Research Project to collect and analyze data bearing on employment, unemployment and relief, traces the progress of the outstanding technological and other changes that influenced employment opportunities in phosphate-rock mining in the United States between 1880 and 1937, and attempts to throw light upon the probable effects of similar developments in the future.

The report of the study, written by A. Porter Haskell, Jr. and Dr. O. E. Kiessling, lists four major types of change which influenced the amount of employment in the industry between 1880 and 1937. The changes that tended to expand employment were given as: (1) a twentyfold increase in the volume of production, and (2) gradually increasing natural difficulties that accompanied depletion of the better and more accessible deposits within each producing area. The authors found that changes which tended to diminish employment were: (1) Labor-saving technological improvements, both mechanical and non-mechanical, and (2) the concentration of production in areas having superior deposits and in larger and better mechanized mines within each producing area.

The report added that a fifth major change—a reduction of at least 20 per cent in the number of hours of work per week constituting full-time employment—tended to increase the number of workers employed but it did not appreciably affect the total man-hours, or amount of labor, required.

The survey showed that production increased rapidly from less than 212,000 long tons in 1880 until 1912, when nearly 3,200,000 long tons was mined. The first substantial slump came during the World War, when exports shrank to nearly one-tenth of their former level. Later, however, in response to the higher prices of agricultural products and the increased domestic demand for fertilizers during the war period, production increased during 1916 and 1917 but fell again in the next two years, partly because exports reached an all-time "low" and partly because of labor disturbances in Florida. From 1932 to 1937 production again increased, reaching an all-time "peak" in 1937 of slightly more than 4,260,000 long tons.

The number of workers employed in the industry in 1880 was slightly less than 2,500, increasing steadily until 1909, when employment reached nearly 7,900 men. The rise, however, was at a less rapid rate than the increase in production. The lowest point in employment was in 1932, when only about 1,900 men were employed, but the number had grown to nearly 3,500 workers in 1937. The study showed that while a greater tonnage was mined in 1937 than in 1920, only about half as many men were employed.

Over the 19-year period from 1919 to 1937 the output per man-hour increased from less than 0.20 to about 0.55 long ton, and the trend was constantly upward.

Commenting that generalization regarding future trends of employment and output per man is difficult because important potential labor-saving developments frequently can not be foreseen, the authors nevertheless draw certain conclusions as to the probable output per man and employment in the industry during the next ten years, and in the years after the next decade.

The report estimated that long tons per man-hour probably will increase in the industry as a whole from 0.55 in 1937 to about 0.70 or 0.75 by 1947. Aside from the usual steady replacement of obsolete or worn-out equipment with new units that are larger and more efficient, the most important developments, the authors believe, will be a wider use of flotation and related recovery processes, continued concentration of production in better mechanized mines, more complete utilization of plant capacity, and possible changes in the methods of manufacturing phosphate fertilizers.

The authors referred specifically to the possibility of important technological changes that may develop from the manufacture of phosphate fertilizers by blast-furnace, electric-furnace, and so-called deflourination processes.

"The mining industry," the report observed, "does not manufacture fertilizers or use these processes at present, but it may in the future, if they are improved enough to compete with sulphuric-acid methods of making superphosphate. Although it is impossible, of course, to say when and by whom these processes will be used, the results of experimental work being done by the Tennessee Valley Authority and the availability of cheaper heat and power have done much to justify the belief that either the mining or the fertilizer-manufacturing industry will at least begin using them during the coming decade."

The report, with respect to the outlook for employment in the next decade, pointed out that roughly 7.7 million man-hr. was required to mine the industry's record production of 4,261,000 tons in 1937, and observed that if the output per man-hour increased to 0.70 ton by 1947, production would have to reach slightly more than 5,400,000 tons to afford the same amount of employment.

"In view of the estimates of future consumption," the report continued, ". . . and in view of such uncertain factors as the level of future farm purchasing power, it may seem optimistic to expect such a large increase in production. Nevertheless, after taking into account the strong influences forming new consumption patterns, the authors believe that this tonnage will approximately be reached during the coming decade. In supporting this conclusion it should be pointed out that, although there are no indications that exports will expand notably, there are a number of indications that domestic consumption is likely to increase by substantial amounts. Principal among these are:

"(1) The annual net loss of elemental phosphorus from our agricultural lands (about 365,000,000 acres of harvested crop lands and about 1,000,000,000 acres of grazing lands in 1930) is estimated to be 1,400,000 short tons a year by one authority and slightly more than 2,773,000 short tons per year by another. This is equivalent to about 10,000,000 short tons, or slightly less than 9,000,000 long tons, of phosphate

rock of average grade with respect to the first estimate and almost twice this tonnage with respect to the second estimate.

"Since in both instances the net-loss estimate was based upon a domestic consumption of about 2,500,000 long tons of phosphate rock per year, it is apparent that something between 11,000,000 and 20,000,000 long tons is required to maintain the phosphorous content of our soil at its present level. Over-all estimates of phosphorus losses, however, include losses from large areas—such as pasture and hay lands—to which the extensive and continued application of commercial fertilizer may never be expedient. Estimates of losses based on harvested acreages only are less imposing but still show a large margin between the phosphorus lost in crop production and that replaced by fertilizer.

"(2) Chiefly because of this rapid depletion of soil fertility, part of the cash allotments paid to farmers under provisions of recent agricultural-production control and soil-conservation laws were made commensurate, within certain limits, with the amount of fertilizer used. Although allotments paid for the use of phosphate fertilizers vary widely between different areas and crops, the general practice is to pay the individual farmer about half (and more in many instances) of the direct cost of a limited amount of phosphate applied to specified soil-building crops.

"These fertilizer-purchase allotments, together with the growth of farm purchasing power, has stimulated a brisk domestic demand for phosphate rock in 1937, chiefly by increasing the consumption of superphosphate and all fertilizers to near the record levels of earlier years. The close relationship between phosphate-rock sales and total fertilizer sales is explained by the fact that superphosphate usually constituted about half the weight of mixed fertilizers, and these in turn represent about 75 per cent of all commercial fertilizers sold. Thus, nearly all the factors influencing general fertilizer consumption as a rule affect phosphate-rock consumption in closely similar manner.

"All indications point toward a continuation of the fertilizer-purchase allotments upon substantially their present basis. Part of their stimulus to phosphate-rock consumption has occurred already, but their continuation, plus their cumulative effect upon consumption patterns, will probably increase phosphate-rock consumption, if farm purchasing power is at sufficiently high levels.

"(3) Available data that throw light upon farm purchasing power may be summarized briefly as follows: The volume of farm production reached an all-time 'peak' in 1937, slightly above the previous 'peak' in 1931 and 13 per cent. above 1929. Farm cash income climbed steadily after 1932 and reached nearly 84 per cent. of the 1924-29 average in 1937. . . . By August, 1938, however, unit purchasing power of farm products had declined to about 80 per cent. of the 1924-1929 average, chiefly because of the 1937-38 decline in prices.

"Bumper crops and lower prices point toward lower farm purchasing power in the immediate future and possibly during the next two or three years. To anticipate increased consumption of fertilizer implies continued success of the agricultural-adjustment program in continuing or raising farm purchasing power.

"(4) Another important factor that promises to increase the demand for phosphate rock is the favorable outlook for the prices of superphosphate and mixed fertilizers (containing superphosphate) that will encourage domestic consumption. . . .

"(5) There is reason to expect a continued increase in the world demand for cotton and tobacco, for which large amounts of phosphate fertilizers are used. . . .

"(6) There is reason an anticipate a continued increase in the per capita consumptions of fruits and vegetables, for which large amounts of fertilizers are purchased. . . .

"(7) Not only is a larger average individual consumption of fruits and vegetables likely, but the number of individuals to be fed and clothed also promises to increase, . . . and

"(8) . . . Roughly $4,000,000 was spent by chemical manufacturers during the last two years for building new furnace plants to manufacture elemental phosphorus and other nonfertilizer phosphorous materials and the consumption of phosphate rock for these uses may be expected to continue its upward trend during the coming decade."

The report summarizes its forecast of outstanding developments in the more distant future and their probable effects upon employment and output per man in the industry as:

"(1) Depletion of reserves under competitive conditions probably will force Florida hard-rock mines to cease production within the next 25 years. Since the output per man at these mines will always be relatively low, their closing will reduce employment and increase the average output per man in the industry.

"(2) Florida land-pebble mines will play an increasingly important rôle in the industry until their reserves, which were more than 500,000,000 long tons in 1937, approach depletion. This is not likely to occur for more than 100 years, allowing for a large increase in the present rate of land-pebble production. . . .

"(3) Although the amount of Tennessee brown-rock reserves recoverable with modern methods is not known, it is thought to be large enough to enable mines in this area to furnish approximately their present share of the industry's production for at least 40 more years, probably much longer. . . .

"(4) Since the Tennessee blue-rock reserves contain more than 83,000,000 long tons of fairly-high-grade rock lying in beds nearly 2 ft. thick, blue-rock mines will probably become important producers when Tennessee brown-rock and Florida land-pebble reserves are exhausted. Their potential importance, however, will not be equal to that of underground mines in the western states, where deposits are generally from two to five times as thick.

"(5) The tremendous underground reserves in the western states—about 6,500,000,000 long tons—doubtless will furnish a constantly-increasing share of the industry's production in the future. First, however, some of these developments must occur: serious depletion of Florida land-pebble and Tennessee brown-rock reserves; technological improvements that will enable underground mining to compete more effectively with large-scale open-pit mining than is now possible; lower freight rates than are available to-day; expansion of phosphate consumption in areas that are more accessible to western mines than to Florida land-pebble and Tennessee brown-rock mines; and further improvement in processes of manufacturing concentrated phosphatic fertilizers, including the availability of extremely-cheap heat and power for use in these processes.

"With reference to the output per man and employment in the industry during the two decades following 1947," the report comments, "the writers conclude the output per man will continue to increase, the rate of increase, however, is likely to be somewhat slower than in the past, as it becomes increasingly difficult to achieve substantial labor savings in already highly mechanized and efficient operations, and as less production is shifted from the low-output-per-man areas to the Florida land-pebble mines where the output per man will be highest.

"When these future gains in output per man are matched with the growth in production that can reasonably be expected, indications pointing toward slowly-declining employment during this period seem to outweigh those pointing toward expansion."

By W. E. TRAUFFER

North Carolina Aggregates Producer Thoroughly "Sold" on Diesel Power

A view of the plant showing the flume, stiff-leg derrick, sand tanks, etc.

ONE definite impression which the sand-and-gravel industry makes on any one familiar with operations in various sections of the country is the wide variety of methods and equipment used to prepare this material for sale. This variety is to some extent due to the fact that no two producers have exactly the same conditions to contend with and each must depend to a large extent on his own ingenuity in solving his problems.

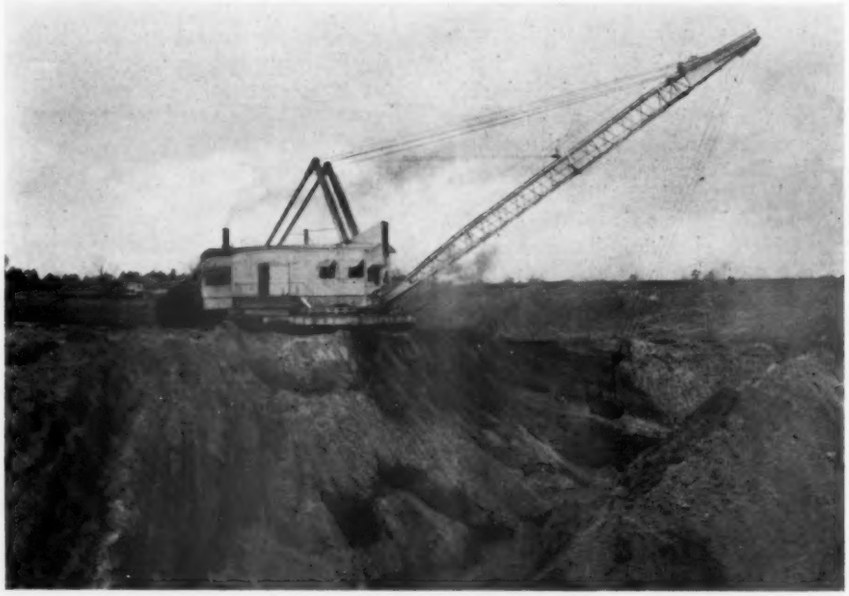
A good example of a sand and gravel plant where things are done in what experience has shown to be the best way under existing conditions is that of the B. V. Hedrick Gravel & Sand Co., near Lilesville, N. C. This operation was started by B. V. Hedrick sixteen years ago and has grown until it now has a capacity of 2,200 tons in a 10-hr. day. Many improvements have been made since this plant was built, the most recent being the installation of vibrating screens and a reduction crusher late in 1938.

The company owns 2,200 acres of land, most of which contains gravel. The overburden of red clay and sand averages 5 to 8 ft. in thickness, while the gravel deposit is from 10 to 50 ft. deep with an average of 40 ft. Draglines cast the overburden back into the worked-out section of the pit. A Bucyrus No. 20 steam drag-line with a 80-ft. boom and a 3 cu.yd. Page dragline bucket is ordinarily used for stripping, and the loading is done by a Bucyrus No. 24 steam drag-line with a 120-ft. boom and a 3½ cu.yd. Page bucket. When the demand is not equal to the plant's capacity, only one dragline is used and this removes overburden while waiting between train-loadings. It is planned to convert the large drag-line to Diesel power.

The haul to the plant averages ¾ mi. downgrade. Three trains are used, one usually being loaded while another is in transit and the third is being dumped. A Baldwin 18-ton steam locomotive hauls a train of three 10-cu.yd. Western dump cars. Two trains of 12-cu.yd. Western all-steel air-dump cars are hauled by 28-ton and 24-ton Porter steam locomotives.

The contents of the cars are dumped into a 24-cu.yd. steel hopper on a hill above the plant. Two 6-in. jets of water, one at the bottom and one at the top of the back of the hopper keep a steady stream of material flowing out of the hopper and down a flume to the plant. A steady feed is obtained by regulating these jets and poking with a long rod when necessary. The flume is 250-ft. long and has a drop of 24 ft. in that distance. Originally a wooden flume was used, but a few years ago it was replaced by the present steel flume. This is 24 in. wide and 18 in. high and is made of ½-in. steel plate. A steel lining takes the wear. This method of conveying gravel to the plant is said to have been originated in this territory and the writer knows of only a few other plants using it. It is ideal for this operation because the plant, at railroad level, is far below the pit level, and there is an ample supply of water. This method also gives the material a thorough scrubbing and soaking before it enters the plant.

Sand, gravel and water are discharged from the plant end of the flume into an



The large steam shovel with 3½-cu.yd. bucket loading gravel to cars.

Looking down flume toward plant from the loading hopper.

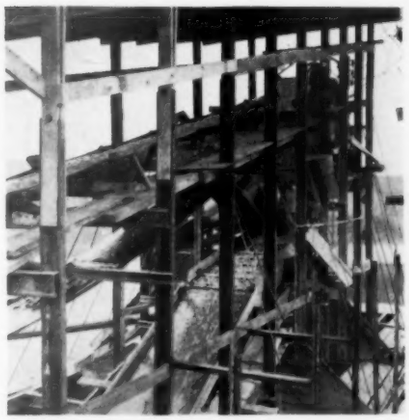
Rail-mounted Diesel-powered crane which loads from stock-piles. It is being moved by a Diesel tractor.

8-ft. by 10-ft. revolving screen which has a closed end and slopes toward the feed end. This screen breaks the flow of the water and also creates a churning scrubbing action. It also serves as a scalper and is equipped with 1-in., 1½-in. or 2½-in. perforated plate depending on the type of product desired. Ordinarily 2½-in. plate is used and the oversize, about 30 per cent. of the total, is discharged into a Telsmith No. 36 Gyrasphere crusher set at the same opening. When other sizes of plate are used, the crusher opening is changed to suit. Sometimes, to fill special orders, the crusher opening is set as low as ½ in. to produce as much fine material as possible.

The material passing through this screen is discharged into a 7-ft. by 12-ft. revolving screen which is usually equipped with a ½-in. inner jacket and a ⅛-in. outer jacket. When concrete sand is to be produced, the outer jacket is removed.

The sand and water from this screen are flumed to a 10-ft. by 65-ft. concrete sump, where the sand is settled out. The water overflows into a waste pond.

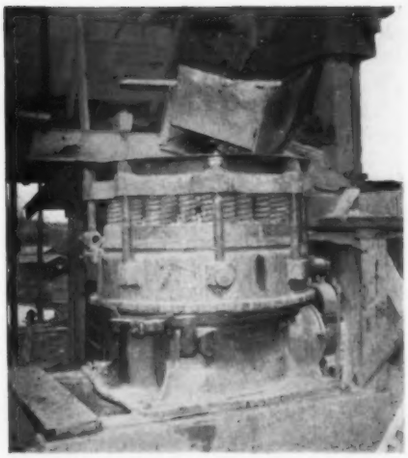
The material retained on both jackets of the second revolving screen is discharged on a 30-in. by 50-ft. belt-conveyor together with the product of the crusher. This conveyor feeds a 4-ft. by 12-ft. Screen Equipment Co. Seco 2-deck vibrating screen. The oversize from this screen goes to another Seco



Conveyor and two vibrating screens over the storage bins.

Close-up view of one of the vibrating screens.

Looking into the 7-ft. by 12-ft. revolving screen while in motion.



Crusher used to reduce oversize gravel.

Stripper which makes concrete blocks used in rebuilding company houses.

screen, which is of the same type and size and has two sizes of cloth on its bottom deck. Together these screens produce five sizes of material: 2½-in., 1½-in., 1-in., ¾-in., ½-in., and ¼ to ⅛-in. A third Seco screen has been purchased and this is to be used with other new equipment in rebuilding the sand department.

These various sizes of gravel are stored in a wood-and-concrete bin having six compartments with a combined capacity of about 600 cu.yd. Gates under these bins drop the material on a tunnel belt-conveyor for loading either single or mixed sizes into cars for shipment. A perforated plate with jets is used for a final rinsing at the loading point.

The spouts from the screens to the bins are so arranged that when the bins are full any size of material can be discharged to a stock-pile. A steel stiff-leg derrick, with a 115-ft. mast and a 100-ft. boom handling a 3-cu.yd. Brownhoist clam-shell bucket, transfers this material to larger stock-piles. This derrick also loads cars from the stock-

piles and can also feed this material into a bin from which it is discharged on the belt-conveyor running to the vibrating screens for regrading. This derrick was purchased a few years ago, and early in 1939 a 47-hp. Caterpillar Diesel engine was installed to operate it.

An Orton Caterpillar Diesel-powered crane mounted on rails, originally a steam drag-line, has a 1½ cu.yd. clam-shell bucket and is used for stock-piling and loading. An Erie ¾-cu.yd. steam crawler crane is also used for this work. Both machines can also be used for loading out sand from the sump. A Caterpillar 30 tractor does general work about the plant and is also used to move the rail-mounted crane.

Maintaining an adequate water supply has in the past been quite a problem. Water is ordinarily obtained from a 40-acre pond near the plant. In a dry season this pond was not adequate and some years ago several additional ponds were made to supplement the first.

The company recently installed a small concrete-block plant and is using the blocks to build a new house. These blocks will also be used in rebuilding the 22 houses which the company maintains for its employees. A small job mixer supplies the concrete for a Multiplex hand stripper machine.

A 6-room office building was built in 1929 of reinforced concrete.

All the water for the dwellings comes by gravity from a spring 35 ft. higher than the dwellings, while that for the locomotives comes by gravity from the pits.

Accidents Reveal Existing Hazards

Generally, an accident involving electricity is a serious accident. Too often the victim is either maimed for life, or will never live to tell how it was caused.

Three reports of such accidents and their subsequent investigations appear in a recent issue of the monthly news letter of the Cement and Quarry Section of the National Safety Council, edited by Jack Dempster of the Canada Cement Co., Ltd.

In the first case some repairs were necessary to the equipment in the power house at a cement plant. This equipment was on a half floor above. Underneath, on the concrete floor, were live wires carrying heavy voltage.

The workmen were informed of the danger, warned, and ordered to get the equipment away from the top. The space they had to work in was confined and one man rebelled against it. He went down underneath, tried to loosen the equipment from the high-voltage room, reached over—and was killed instantly.

In the second case, an electrician was putting new copper contacts on the starting fingers of a switch. He had pulled out the master switch but, disobeying instructions, had neglected to lock it out. At noon, he went to lunch leaving the job unfinished. During the lunch hour another man wished to use the machinery and seeing the main switch open and without making inquiries, threw it in and started his machine. Upon completing his job, he went away without opening the switch again, didn't give it a thought. The electrician came back to his switch without looking at the main switch, and started working on it again. He stepped on some wet salt on the floor, and was killed.

In another cement plant a man was so severely burned that he was unable to go back to work for a month. The injured man pulled a 440-volt line-disconnect knife-switch, which was on a motor driving a pivoted-bucket conveyor. One top section of the conveyor had been oiled. He had been sent by the repairman down to the ground floor to unlock the switch box and close the switch, then signal to the repairman who was operating a push-button start-and-stop control, to move and spot the next section of the conveyor to be oiled.

The man had been told to disconnect the switch and lock the box when the conveyor had been spotted and stopped. He saw the conveyor stop and instead of making sure that no further move would be made, he started to pull the switch. At this same moment, the repairman pushed the starter button, throwing the full starting load on the line. This start was being made to move the conveyor a few feet further as, due to coasting, it is almost impossible to stop it in the desired place the first time.

Investigation further indicated that the injured man held the leather-tipped, wooden pull stick with his right hand only 7 in. from the switch handle while standing directly in front of the switch, yet the pull stick was 25 in. long.

It was further elicited, during the investigation that it was possible to have a repetition of the accident on five conveyors, an elevator and a Fuller-Kinyon pump in the finish mill; a conveyor in the raw mill; a feed belt in the rock dryer, and a conveyor in the coal mill.

Phosphate-Rock Used in Making Match Books

Most of us are blithely unmindful of the origin of many little articles we use daily. The friction strips on match books, for example! How many of us have stopped to think that the striking surface owes its efficacy to the miner?

Phosphate rock mined in Tennessee and Florida furnishes the red or amorphous phosphorus and mines in China or Mexico supply the sulfide of antimony, the U. S. Bureau of Mines points out. These two products are glued to the surface of the paper strip, which may have been made rough previously by a coating of glue and sand. Manganese ore is sometimes substituted for the antimony sulphide in the compound.

Something like three billion match books are manufactured yearly in the United States, yet each book requires so little material for the friction strip that the national total yields but little revenue to the miners. However, the product has become so much a part of our lives that were we to be deprived of it we should be greatly inconvenienced at both work and play, and consequently its true importance is not measurable in dollars.

Cement Exports from Sweden Show Decline

Cement exports from Sweden during 1938 decreased to 48,000 tons, or about 288,000 bbl., compared with 74,900 tons, or about 450,000 bbl. exported in 1937, it was disclosed by a report from the American Consulate at Goteborg, Sweden.

Despite export decreases, the Swedish cement industry made considerable progress in 1938 since domestic consumption increased by 21 per cent. Cement prices remained stable despite an increase of about 7 per cent. in wages, the report stated.

An important enlargement of the industry's factory in Limham was completed in 1938, increasing the production capacity of this factory to about 2,500,000 bbl. a year.

CO_2 Recovery *(from page 28)*

supplied most of the equipment. This gas is drawn through the louvres and then passed through coolers, scrubbers and the precipitator before it is compressed to 75 lb. and is ammonia-cooled. It is then further compressed to 400 lb. and is ammonia-cooled to —30 deg. F. at which temperature it liquefies. The liquid CO_2 is then allowed to expand in a Southwark CO_2 snow press in which 10-in. 50-lb. dry-ice cubes are made under 2,000-lb. pressure. These cubes are then wrapped, weighed on a Toledo dial scale, and put into insulated boxes for storage or delivery. Somewhere in the neighborhood of 10 per cent. of the CO_2 gas produced is lost in this process.

Survey Indicates Use of Automatic Control Is Rapidly Increasing

INCREASED efficiency and lower operating costs are listed as outstanding effects of the widespread use of instrumentation in industry in the report of a survey of industrial instruments, recently made public by the Works Progress Administration.

This report, entitled *Industrial Instruments and Changing Technology,* prepared by the National Research Project of the W.P.A., showed that the increased use of measurement devices and automatic control instruments had speeded up production, improved the quality of products, reduced costs and increased the productivity of labor.

Corrington Gill, assistant administrator in charge of W. P. A. research, pointed out in his letter of transmittal that they also have played an important *rôle* in the development of such new services or products as air-conditioning, radio, plastics, automobiles and airplanes.

The report, published as a booklet of 148 pages, illustrated, and with numerous charts and tables, was prepared by George Parazich and associates as one of the reports of the National Research Project on Reemployment Opportunities and Recent Changes in Industrial Techniques. The National Research Project is directed by David Weintraub.

Pointing out that instruments make for precision control of processes and for efficiency in the use of raw materials, machinery and equipment, the report said many modern manufacturing plants employed several hundred instruments in their production processes, while some of the larger concerns used thousands.

Such industries as petroleum refining and automobile manufacturing, for example, rely heavily on instruments, the survey showed. As an illustration, the report cited heat-treating of steel, a process in which skilled craftsmen once judged the temperature of steel by its color. The introduction of the pyrometer, an instrument which measures and indicates temperature, eliminated the need for this skill, but the operation still required manipulation to regulate the temperature. The subsequent development of a temperature controlling apparatus made the heat-treating process almost entirely automatic.

The study showed that instruments incorporating automatic control features gradually were superseding simple indicating and recording types, and that such instruments permitted economies by the reduction of waste through maintenance of uniform operating conditions and by the use of cheaper raw materials.

"The speeding up of production processes by instrumentation," the report said, "is one of the most effective methods of furthering operating economies. Such acceleration may be achieved by increasing the rate of output either of individual machines or of a number of machines which may have been interlocked by various types of instruments.

"In chemical and process industries alteration of concentrations, temperature, and other conditions of operation, or introduction of catalytic agents may produce a similar result. The effect is a two-fold saving: operating costs are cut down and at the same time capacity is increased. In other words, enhanced output is accomplished with the same capital outlay."

The report said instruments served to accelerate production also by reducing the total time required for the production cycle, this increasing output with the same equipment and labor. As an example, it cited an installation of temperature and humidity control in a lumber-drying kiln which reduced the drying time by 4 days and raised the annual capacity of the kiln by approximately 46 per cent.

With regard to the importance of keeping conditions uniform throughout the production cycle, the report pointed out that in the clay and porcelain products industry, temperature changes in the kiln, which often occur without fuel control, cause defects in the products, and that in kilns where temperature is manually controlled spoilage might run as high as 20 per cent. On the other hand, the report continued, pyrometer-controlled kilns not only cut down spoilage but produced better ware. One large porcelain manufacturing concern, the report said, found the installation of pyrometers for furnace-temperature control yielded large savings not only by reducing waste but also by eliminating costly training of workers.

"In some industries," the report said, "fuel and power account for a relatively large proportion of total operating expenses. Improvements in fuel efficiency have been significant technological developments which have contributed in large measure to the reduction of fuel and power costs.

"Instruments make possible important savings in fuel by increasing the amount of utilizable heat derived per unit. Central stations now use less than 1.5 lb. of coal per kw.-hr. as compared with about 3 lb. in 1920 and 6.4 lb. in 1902. There have been savings also in iron blast furnaces; here fuel consumption declined from about 3,400 lb. per ton of pig iron in 1920 to less than 3,000 lb. in 1936. The B. t. u. recovery of coke by-products per B. t. u. of coal charged was increased from approximately 71 per cent. in 1920 to 85 per cent. in 1936."

During the last two decades, the report went on, instruments to improve boiler efficiency have been widely introduced. In addition, it said, fuel can be conserved by metering and other instrumental control of process steam or power. A survey of a large sugar refinery a few years ago was cited. This investigation disclosed that prior to the installation of flow meters the boiler pressure was kept excessively high. Moreover, because they did not know the exact steam requirements for processing, the pan operators wasted large quantities of steam by opening valves more than was necessary. With an initial investment of $4,800, instrumentation not only brought about more uniform operation of the sugar pans, but resulted in an estimated monthly saving of approximately 1,000,000 lbs. of steam, equivalent to a yearly fuel saving of approximately $6,000.

In some processes, it was found, fuels which have been produced with less labor per unit of heat, now can be used in place of those representing a greater element of labor. Furthermore, instruments were found to aid in reducing the amount of fuels required for a given product and thus cut down the labor entering into it.

"Instruments in some instances," the report said, "serve as direct substitutes for labor. Relays, switches and other mechanisms which transfer the actions of an instrument into automatic operations of a machine have eliminated manual workers. Inspection and handling operations are particularly susceptible to automatic control in mass-production industries. A wide variety of automatic devices has been applied

in these industries to mechanize handling and visual inspection tasks."

The report also pointed out that the installation of industrial instruments sometimes resulted in changes in the specifications for individual jobs.

"The judgment of a trained foreman is frequently made unnecessary by an instrument which indicates a condition so precisely that an unskilled operative can give the process the necessary attention," the report said. "Where a new skill is introduced it is likely to be of a different sort, for instance, one requiring an ability to read meters and perform calculations."

The report concludes with a 30-page selected bibliography covering nontechnical materials which show the extent and effects of instrument applications.

Trade-Mark Registration

By ROGER S. CALNAN
Washington, D. C.

IN these days of highly competitive trade practices the importance of using and registering trade marks for products can not be too strongly emphasized to the man in business. A good trade mark is a most valuable asset, the medium through which goodwill to a large extent is acquired. The primary function of a trade mark is to indicate the origin or ownership of the goods on which the trade mark is used and it has been aptly said "a trade mark is a firm's commercial signature".

The growing importance of trade marks in relation to fair trade-practice laws was shown in the decision of the United States Supreme Court upholding the validity of fair-trade statutes of two states, namely, Illinois and California, which prohibit sale of trademarked products below prices fixed by the producer by contract. In defending a state's right to permit procedure to contract for the selling price of trademarked goods and prohibit cutting below that price, the court ruled: "We are here not dealing with a commodity alone, but with a commodity plus the brand or trade mark which it bears as evidence of its origin and of the quality of the commodity for which the brand or trade mark stands. And good-will is property in a very real sense, injury to which, like injury to any other species of property, is a proper subject for legislation. Good-will is a valuable contributing aid to business, sometimes the most valuable contributing asset of the producer or distributor of commodities. And distinctive trade marks, labels and brands, are legitimate aids to the creation or enlargement of such good will."

For centuries trade marks have played an important *rôle* in establishing the good-will of a business. In our time this has been demonstrated by such universally known trade marks as "Ford", "Kodak", "Celluloid", "Frigidaire" and 'Vaseline", all registered trade marks. Although patents expire with the passing of time, United States trade-mark registrations under the act of February 20, 1905 are renewable. Thus, through proper use of a tade mark on a patented article the demand for that article will continue even after the patent has expired as a result of the good-will acquired through the trade mark over a period of years.

A trade mark is a distinctive word, mark, symbol, pictorial representation, name of an individual, firm or corporation or a combination of the foregoing. The best type of trade mark is a newly-coined word which is suggestive of the goods but which is not descriptive of the goods on which it is used, as descriptiveness is an objectionable feature. When considering the adoption of a trade mark it is advisable to approach the subject from the angle of registerability, assuming that the person intends to have the mark registered. It is a good idea to ascertain whether the mark under consideration is sufficiently arbitrary and technical to meet the requirements for registration as it may save headaches and money in the long run if it is learned beforehand whether the mark is invulnerable. When adoption of a particular trade mark has been definitely decided on, it is advisable to have a preliminary search of the existing registrations at the Patent Office made to ascertain whether a confusingly similar trade mark has already been registered for like goods. Over 330,000 trade marks have been registered at the Patent Office in the various classes provided by law and from the writer's experience during several years as a member of the trade-mark examining staff at the Patent Office it may be said that a large number of applications are rejected because conflicting trade marks have been previously registered. The Patent Office does not advise before an application is filed as to whether the owner of a trade mark should apply for registration and it does not give advice as to whether a confusingly similar trade mark has been previously registered, but the search rooms of the Patent Office where copies of the registrations are filed are open to the public and attorneys are daily making searches there.

It is extremely important that the name which is used as a trade mark be so indicated in advertising and business correspondence either by displaying the words "trade mark" in connection therewith, by placing the trade mark in quotation marks or by italicizing the name used as a trade mark. Also, when the mark has been registered, use of the notice "Reg. U. S. Pat. Off." with the trade mark will be sufficient to show that it is a trade mark. The trade mark should never be used in any manner so as to indicate that it is merely the name of the goods. A number of owners of well-known trade marks have lost their trade-mark rights in the particular marks because they did not take proper steps to indicate to the purchasing public that the coined names which they were using on their goods were the trade marks for the goods and not merely the name of the particular goods. The use of a trade mark in that manner eventually may cause it to become generic and, therefore, not subject to exclusive appropriation. In effect, that is what happened to the trade mark "Aspirin" and only recently to the trade mark "Cellophane" by decision of a Federal court.

Some of the advantages of a United States trade-mark registration are: a registration under the 1905 act is *prima facie* evidence of ownership of the trade mark and gives the owner the right to sue in a Federal court for infringement with increase of damages and the destruction of the infringer's labels; it gives the owner the right to prevent the importation of goods bearing an infringing trade mark; further many foreign countries will not register the trade mark of an American, if the trade mark has not been first registered in the United States. Also, a registration at the Patent Office is indication to a subsequent applicant for registration of a similar mark for like goods that a conflicting trade mark has already been used and registered.

A prerequisite to registration at the Patent Office is use of the mark on goods shipped in interstate or foreign commerce. The particular method of transporting the goods is immaterial for registration purposes. In addition to comprising certain formal papers, the application must include five specimens, such as labels, etc., showing the trade mark as actually used on the goods and a formal drawing of the trade mark. In passing, it may be well to add that a name or any other symbol does not become a trade mark until it has been actually used on the goods.

A MODERN KAOLIN PLANT IN GEORGIA

THE Georgia Coating Clay Co. operates at Macon, Ga., one of the most interesting and efficient plants in the kaolin industry. Completed in September 1937, this plant was operated primarily to provide carload samples for the trade until July, 1938, when it went into capacity production.

The plant was originally designed to produce 1,500 tons of pottery kaolin and 500 tons of paper grade per month. This proved to be an insufficient output and unsuitable proportioning of the two products because of special qualities of the clay which make it very desirable for the paper industry. For this reason the low-tonnage equipment designed to prepare the product for the paper industry was dismantled and modern and efficient air-classification machinery installed. The plant capacity is now about 4,000 tons per month of both grades. The pottery product is sold through the R. T. Vanderbilt Co. of New York under the trade name of "Cherokee Clay." The paper product, which is designated "Air Cleaned Clay," is handled by Howard D. Mcincke of Chicago.

Kaolin being weighed from storage on a belt conveyor feeding the wet and dry departments.

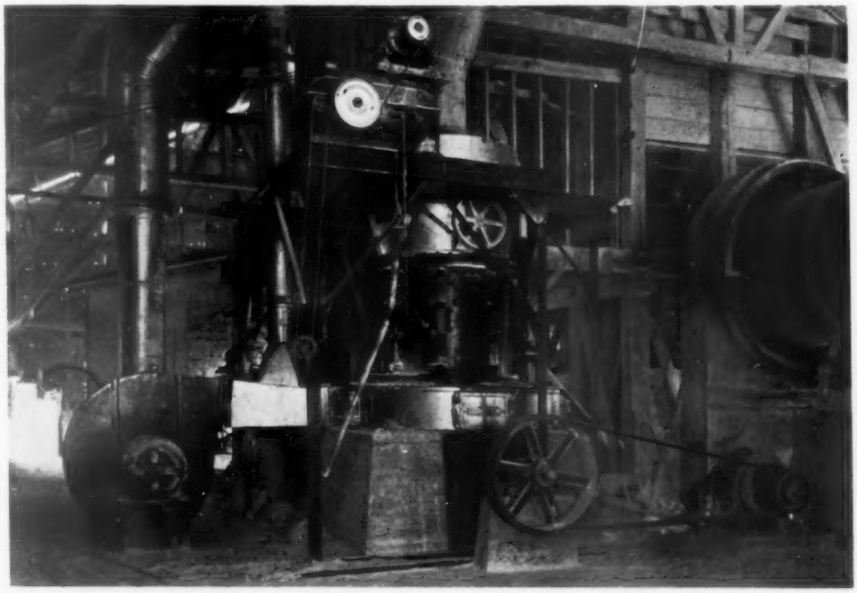
The plant of the Georgia Coating Clay Co., at Macon, Ga., with truck ramp and raw-material storage building in foreground.

The deposit is located near Franklinton, Ga., about 11 mi. south of the plant. The company has a long-term lease on a 450-acre property. The overburden, which averages 30 ft. in depth, is removed in steps by a Bay City 65 shovel driven by a Cummins Diesel engine and fitted with a 1¼-cu. yd. dipper.

Two 6-cu. yd. Koehring rubber-tired Dumptors are used to haul the overburden to waste dumps. According to E. Y. Mallory, vice-president of the company, these Dumptors are ideal for the existing conditions. With an average haul of ¼-mi. these machines are hauling from 1,000 to 1,500 cu. yd. per 10-hr. day, keeping the shovel operating at capacity.

The kaolin deposit, which ranges from soft to semi-hard, is about 20 ft. deep. A ¾-cu. yd. General Invincible shovel, powered by a Buda Diesel engine, loads the kaolin into 5-ton trucks. A fleet of six of these trucks hauls the material to the plant in Macon. The ratio of dirt to clay in the material removed has been about 1½ to 1, but this will soon become 2½ to 1 because excavating has been done along a ridge, which will ultimately have to be entered.

At the plant the clay is dumped into a hopper from which a pan feeder discharges it into a roll-crusher with one smooth roll and one slugger roll. A



One of the two 5-roll, high-side mills used for grinding kaolin. Pipes to and from collectors are above.

The 6-ft. by 50-ft. semi-indirect gas-fired rotary drier.

The Diesel shovel loading overburden to haulage unit.

The ¾-cu.yd. Diesel shovel loading kaolin into trucks.

The 330-hp. natural-gas engine which operates the plant.

belt-conveyor carries the product of the crusher into a storage shed of 2,500-ton capacity. Kaolin is shoveled by hand into a wheel-mounted hopper under which is a Hardinge constant-weight feeder. The feeder discharges the kaolin on a belt-conveyor which serves both the wet and dry departments of the plant.

When the wet department is in operation the clay is discharged into two log-washers followed by a drag-classifier. This discharges the clay on an Orville Simpson Rotex screen followed by another Rotex screen. These screens remove extremely fine material and the drag-classifier removes such heavy impurities as mica, rutile, etc.

The material retained on the screen is pumped to three settling tanks where more of the water is removed. It is pumped from these tanks into a surge tank from which an Allis-Chalmers pump feeds it to a battery of six Patterson hand-operated filters. Under 140-lb. pressure these produce 27-in. cakes, which are fed into a Schofield 6-ft. by 30-ft. semi-indirect drier fired with natural gas. The dried kaolin is discharged to an elevator from which it falls either into loading bins or direct into cars.

The clay for the dry department is discharged into another roll-crusher of the same type, which reduces it to ½-in. size and under. The crusher product can be discharged to either of the two driers, but the new 6-ft. by 50-ft. Louisville Type L drier is ordinarily used. This drier is of the semi-indirect type and is also fired with natural gas. The material fed to it has an average moisture content of 20 per cent. and its product averages 1 per cent. moisture. The capacity varies from 5 to 10 tons per hr. depending on the type of product being made. According to Mr. Mallory, this drying is done without any calcination or discoloration of the kaolin which would lower its value.

The product of this drier, and that of the old drier when it is being used for dry material, is discharged into a central surge bin. From this bin the kaolin falls into the two Raymond 5-roll, high-side mills which are equipped with double Whizzers. The product of these mills has a fineness of 99.97 per cent. through 200-mesh and is blown to a collector from which it is discharged into a bin. From this bin the material can be loaded into cars in bulk or can be fed to a 4-tube bag-packer filling 50-lb. or 100-lb. bags. Shipments are made over three trunk-line railways.

The natural gas used for drying in this plant is piped from the oil fields of Louisiana through a line which terminates at Macon. The low cost for which this gas could be purchased was one of the main reasons for the selection of the plant site, as this fuel would not have been available at the deposit. The volume of gas used is so great that a very low rate was obtained. For this reason the company installed a 330-hp. Cooper-Bessemer natural-gas engine to operate the plant. This engine is direct-connected to a generator which supplies current for all the plant motors. According to Mr. Mallory, the company is making its power at a cost of ½ c. per kw., including overhead and all other charges.

Mr. Mallory has had many years of experience in the kaolin industry and was associated with his father when the latter in 1901 organized what is now one of the largest kaolin-producing companies in this country. He left that company in 1936 and incorporated the Georgia Coating Clay Co. in February 1937. E. J. Sawyer, president of the company, has had many years of experience in the lumber, ice and coal business.

The six hand-operated filters which produce 27-in. cakes at 140-lb. pressure. Conveyor from raw storage is at right.

What the State Legislatures Accomplished During May

LEGISLATIVE proposals affecting the stone, sand and gravel industry continued to occupy the attention of a number of state lawmaking bodies during May, but indications were that they and other measures would be disposed of in practically, if not all states during June as the last of the 44 state legislatures that convened since early January prepared to adjourn.

Unexpected by both administration leaders and legislative observers was the action of the California assembly last month in rejecting, by a 24 to 51 vote, a proposed wage hour act to extend provisions of the national Fair Labor Standards Act of 1938 to all commerce in that state. Passage of the bill, similar to proposals advanced in most legistures this year, had been freely predicted by western observers. Its rejection apparently will make unanimous refusal of state legislatures to follow the national administration in this regard. While wage-hour bills were still pending in several states as PIT AND QUARRY went to press, none was conceded a chance for passage.

The Oklahoma legislature, while failing to approve a bill repealing outright a wage-hour law passed by the 1937 legislature and which the state supreme court had found unconstitutional in its application to male workers, refused to make provision for setting up new "codes" to replace those that expired last month. The net result is, in effect, to nullify provisions applying to women workers that were left standing by the supreme court.

Likewise, organized labor's efforts to gain enactment of "little Wagner acts" has likewise met with failure thus far. Instead of additional state legislatures passing bills patterned after the national labor relations act, the Wisconsin legislature, which had previously enacted such a measure, repealed it in favor of a new law described as being more equitable to employers and workers not a party to labor disputes.

The following state-by-state summary of legislative action in the stone, sand and gravel field supplements material previously carried by PIT AND QUARRY:

California—The severance tax measure reviewed in the April issue of PIT AND QUARRY remained in the assembly committee on revenue and taxation during the past month, with its chances for passage growing dimmer as the session progressed.

The senate passed and the assembly gave second reading to a bill to increase benefits under the workmen's compensation act. It would increase the minimum death benefit from $1,000 to $2,000, and the maximum benefit from $5,000 to $6,000. It would also prohibit deduction from the death benefit paid the dependent any compensation paid an injured worker who later dies. Under the present act, the compensation paid a workman for injury is deducted from the death benefit should he die later.

Two bills seeking to legalize closed shop labor contracts were rejected by the senate labor and capital committee.

Florida—A house revenue bill would place a tax of 50 cents a ton on mining phosphate, lime, lime rock, fullers earth and other mineral products, the revenue to be used to pay old age pensions.

Illinois—Following a favorable committee report, the senate gave first reading to a bill to prohibit use of machinery in manufacture of crushed rock or other road material by convict labor. It would limit use of such material to public institutions owned or managed and controlled by the state or for improvement of public grounds owned or managed and controlled by the state. An identical house bill remained in committee, as did another house measure to encourage use of state gravel on public projects.

On receiving favorable committee reports, a bill to regulate the manufacture, possession, storage, transportation, sale or gift of explosives, repealing the present act covering the subject, was given first reading by the house, while another house bill to provide a lien in favor of any materialman, laborer or mechanic performing work in connection with a quarry, mine, oil or gas leasehold on the land and equipment on the land was given second reading.

New bills, both of which were in committee, would regulate the installation of plastering, stuccoing and cement finishing, providing a $75 annual license fee, and would add a section to the Rivers and Lakes Commission Act.

The latter measure would give the department of public works and buildings power to enter into an agreement with any person, firm or corporation, municipal corporation or political subdivision of the state and federal government, or any agency thereof, to take earth, stone, sand or gravel, or combinations thereof, from the bed or below the bed of any public waters in the state at a price of six cents per cubic yard and with any person, firm or corporation to take coal, gas, oil, or other mineral or substance from or below the bed of such waters after bids are received. Governmental units would be given the right to take earth, stone, sand or gravel without compensation where such material is to be used in connection with any public project. No agreement under the measure would be effective for over five years, and surety bond would be required from any person, firm or corporation to secure payment of amounts due under such an agreement.

Iowa—After receiving house approval, a bill to authorize sale of gravel from beds owned by counties for surfacing lanes and driveways leading to surfaced public roads died in a senate committee at the close of the session. A senate bill meeting a similar death would have authorized condemnation of private lands to obtain gravel and other suitable material for secondary road surfacing.

Massachusetts—A house bill was withdrawn from the committee on mercantile affairs for action by the legislature which would permit use of convict labor in the manufacture of materials and products used in the construction of highways. The measure provides that "no machine except such as is operated by hand or foot power shall be used in connection with such employment."

Michigan—The legislature gave final approval to, and the governor signed a bill to prohibit removal of sand, gravel or other minerals from tax-delinquent lands.

No action had been taken on a senate bill to make all occupational diseases compensable, removing the maximum limit of $3,000 compensation and further liberalizing the compensation statute in favor of the employe.

New Jersey—Awaiting action by the assembly insurance committee was a bill seeking to provide that a claimant for compensable occupational diseases shall file his petition within two years from the time such claimant ceased to be exposed to such occupational disease.

New York—The senate passed and sent to the assembly for concurrence a bill to provide that where natural stone is specified in construction of public buildings or works by state or municipal corporations, preference must be given to such material mined, quarried or manufactured in the state, and if purchased from outside the state the stone or granite must be in rough stock and fabricated within the state.

All other bills pertaining to the stone, sand and gravel industry, including five

proposals to liberalize the compensation statute, remained in committee.

Ohio—Pending in committee was a senate bill to exclude dump trucks used in hauling gravel, sand, dirt, stone and road materials from the jurisdiction of the state public utilities commission, and a house bill to authorize sale of the state-owned Roseville brick plant.

Oklahoma—Legislative adjournment came without favorable action being taken on either of two bills seeking to establish a state-owned cement plant.

Pennsylvania—The legislature approved and the governor signed a bill to exclude explosives used in clay mining or in rock and stone quarries from a 1937 act governing the manufacture, storing and possession of explosives.

Companion house bills, one to repeal the 1937 Occupational Disease Compensation Act, and the other to enact a new law covering the same subject, were passed by the house and given first reading in the senate. The second measure would define the liability of an employer to pay damages for occupational disease contracted by an employe arising out of and in the course of employment and establish an elective schedule of compensation.

Other measures affecting the industry remained in committee.

Texas—The senate passed a bill appropriating $9,500 for the attorney general to gather testimony in the prosecution of anti-trust suits against cement manufacturers. The action followed a hearing before the senate finance committee at which Assistant Attorney General Victor Bouldin said the state apparently has a good case against the manufacturers charged with the violation of anti-trust laws in price fixing. He said the state is paying at least 25 cents a barrel too much for more than 1,000,000 barrels of cement used annually by the highway department, adding that in 45 bids the figures did not vary a fraction of a cent.

Wisconsin—The assembly judiciary committee conducted a hearing on three bills that would empower the state and local governments to engage in the "marketing, selling, buying and manufacturing" of any product or products. Admittedly production-for-use proposals, they were advanced as a means of reducing relief rolls. Widespread opposition to the measures by all lines of business indicated they would not receive passage.

What Size Sheave?

By F. L. Spangler

WHEREVER wire rope is used, the selection of sheave diameters requires some engineering thought in order that the sheave may function as intended, with minimum impairment to itself and to the rope.

There are several factors to be considered in selecting the size of the sheave. Of these the deterioration of the cable caused by bending stresses is probably the greatest.

A sheave so small in diameter that the rope is inclined to take on a permanent set every time it passes over the sheave, is bound to be very destructive to the rope. For any given rope, the smaller the sheave the greater will be the maximum stress introduced in the individual wires of the rope by bending around the sheave.

If internal stresses of considerable magnitude already exist in the rope as a heritage of the manufacturing operations, the stresses put into the rope by loading it and those introduced by bending it will in many cases add to the existing stress, making an exceedingly high total stress. For this reason maximum stresses in a preformed rope are lower than those in a non-preformed rope, and therefore a small sheave causes less damage to a preformed rope than to a non-preformed one. The stresses normally introduced in a rope by twisting and stranding the individual wires in the process of manufacture, are largely eliminated in the preformed rope by permanently forming each individual wire and individual strand to the shape assumed in the finished rope.

The minimum allowable diameter of the sheave depends on the flexibility of the rope and on the material of which it is made. The most common materials of which rope is made are iron—this is really a soft, mild steel—and various grades of steel, such as traction steel, plow steel and others.

Iron rope, being made of a material of comparatively low fatigue strength, will not stand the high stresses that can be imposed on better grades of steel, and therefore sheaves handling so-called iron rope should be larger than the minimum diameters recommended for steel rope.

Breakage of wires caused by repetitive stresses is known as fatigue, in contrast with the parting of wires caused by wear and tear in service. Virtually all the rope discarded in elevator service, for example, is the victim of fatigue and not wear.

A wire will stand a constant, unvarying stress without showing fatigue; it is variation in stresses that produces this condition. As an element of the rope passes on or off a sheave, the bending and straightening of the rope causes changes in the stresses in the individual wires. The smaller the sheave, the greater is the change in wire stress, and therefore the sooner will fatigue breaks develop. Fatigue is also hastened by the frequency with which these changes in stress occur.

Thus it is that when fatigue is an important factor in the discarding of rope, it is especially important that the sheave be chosen of such a size as to prevent excessive bending stresses in the individual wires.

For every operating rope there is a certain "critical" sheave diameter, smaller than which the rope strands can not slide past one another to adjust themselves to the bend, and consequently constructional restrictions will be set up within the rope. Table I gives the "critical" sheave diameters for various types of steel rope.

"Critical" diameters are much too small to obtain satisfactory rope service in most operations. It is better that the minimum size of the sheave be determined by the bending stresses developed in the wires of the rope. The sum of the load and bending stresses should generally be kept within certain limits, depending on the operating conditions and safety requirements. However, for miscellaneous operating ropes for light duty and light loads, there is a preferable minimum-diameter sheave which should be considered as the limit for relatively satisfactory rope service. These diameters, as well as preferred

TABLE I.—CRITICAL SHEAVE DIAMETERS FOR STEEL ROPE (d = diameter of rope)

6 by 7	6 by 19 Seale	6 by 21 Filler 6 by 19 Warrington	6 by 19 Filler Wire	6 by 31 Seale	6 by 37	8 by 19 Warrington	8 by 19 Seale	Tiller
28d	20d	16d	16d	15d	14d	14d	16d	10d

TABLE II.—MINIMUM AND PREFERRED DIAMETERS FOR STEEL ROPE (d = diameter of wire)

Minimum Diameters					Preferred Diameters		
6 by 7	Filler Wire and Warrington 6 by 19	6 by 37	8 by 19	6 by 7	Filler Wire and Warrington 6 by 19	6 by 37	8 by 19
42d	30d	18d	21d	72d	45d	27d	31d

TABLE III.—DRUM AND SHEAVE DIAMETERS FOR MISCELLANEOUS SERVICES

Service	Rope†	Minimum Tread Diameter Drums and Sheaves (d = rope diameter)
Derricks	6 by 19	24d*
Reverse—bend sheave	6 by 19	32d
Shop Cranes		
Drums and block sheaves	6 by 19 Warrington	30d
	6 by 19 Filler	26d
	6 by 37	20d
	8 by 19	20d
Equalizing sheaves	6 by 19 Warrington	16d
	6 by 19 Filler	16d
	6 by 37	11d
	8 by 19	12d
Skull Cracker, Billet Yard, Stripper Cranes	6 by 37	30d
Locomotive Cranes	6 by 19	30d
Electric and Pneumatic Hoists		
Drums and sheaves	6 by 19	24d
	8 by 19	20d
Equalizing sheaves	6 by 19	16d
	8 by 19	12d
Skip Hoists	6 by 19 Seale Lang-lay	60d
Reverse-bend sheave	6 by 19 Seale Lang-lay	72d
Car Unloaders and Dumpers	6 by 19	40d
Grab Buckets	6 by 19	30d
Ore and Coal Bridges	6 by 19	40d
Ballast Unloaders	6 by 19	24d
Brick Machines	6 by 7 and 6 by 19 cast-steel	40d
Flight or Disk Conveyors	6 by 19 I. W. R. C.	48d
Tackle Blocks	6 by 19	20d*

†All ropes are plow steel or improved plow steel unless otherwise indicated.
*Outside diameter. Tread diameter is somewhat less.

diameters, for steel rope, are shown in Table II.

The minimum diameters for sheaves for derricks, cranes, hoists, mines, tackle blocks, steel mills, and certain other applications are given in Table III.

All the foregoing information is based on the assumption that the rope makes a sufficient arc of contact with the sheave to produce maximum bending stresses; that is, the arc of contact is at least equal to the length of lay of the rope. By the length of lay is meant the axial distance that one strand travels to make one complete revolution around the rope center.

In curve or knuckle sheaves, as well as supporting rollers, the departure of the rope over the sheave is comparatively slight, so that the length of contact of the rope with the sheave or roller is generally less than a lay length, in which case the stresses produced by the bending of the rope are considerably reduced. Hence, knuckle sheaves and rollers often have smaller diameters than could be countenanced in the case of proper sheaves.

Thus far we have given consideration to operating ropes. In the case of standing, or non-operating, ropes reeved around a set of two sheaves, the sheaves may have to be chosen of such a diameter as to obtain an efficiency not less than a certain minimum. Because of the loss of strength of the rope caused by bending, the sheaves do not develop twice the rope strength. In a series of tests made with 6 by 19 plow-steel rope by the Bureau of Standards, the following efficiencies were noted:

Ratio D/d	8	10	12	14	16	18	20	22	24	30
Efficiency (*per cent.*)	72	79	81	86	88	92	93	95	95	95

(D = diameter of sheaves; d = diameter of rope)

The principles employed in selecting sheave diameters also apply to the diameters of drums. In addition, there is the matter of traction in the case of traction drums. It is desirable that the friction prevent slippage between the rope and the drum, or reduce this slippage to the minimum. Friction between the rope and the drum can be increased by increasing the diameter of the drum.

Slippage results in wear of the rope and the drum, reducing the life of both.

Traction should also be considered in the case of free-running sheaves, where the inertia of the sheave may be too great to be overcome immediately by the rope upon starting or stopping its travel, in which case there will occur a grinding action between the sheave and the rope, until friction has overcome the inertia of the sheave.

It is customary to state the commercial sizes of sheaves in terms of tread diameters (the diameter at the bottom of the groove), but with block sheaves the practice is to use the over-all diameter.

Soil-Cement at Fair

The equivalent of 17 acres of soil-cement-stabilized roads is in use at the 1939 Golden Gate International Exposition on Treasure Island at San Francisco.

This material, developed by the Portland Cement Assn. is in use for roadways, walks, courtyards and airport aprons at the Exposition.

Marketing of Mica an Intricate Process

The marketing of sheet mica is often an involved process, and the material frequently passes through a number of hands before reaching the consumer, because of the many small mines contributing to the supply, the operators of which are not familiar with trade requirements and lack the capital to do much more than take the mica out of the ground and roughly cob or trim it. They sell it in this form to local jobbers or dealers. The latter often buy the output from a number of mines, and run a central mica shop, employing the necessary skilled labor to trim and grade the rough sheets, reselling the product to larger dealers who, in turn, resell to mica brokers or consign, on order, lots of specified sizes to the actual consumers.

There is probably no other mineral product that passes through as many channels between mine and user as does mica. The small producer is often inclined to regard the middleman in the industry as unnecessary evil, who takes an undue share of the profits, but the actual miner seldom has the necessary capital to maintain adequate stocks from which he can fill orders for any specified grade or size at short notice, and he may not have the requisite knowledge of trade standards and specifications or of demand and price trends, so that the dealer forms a useful link between miner and ultimate consumer. The larger, steady producer often ships direct to consumers, netting a greater share of the profit.

Ground mica, being a bulk commodity and prepared in finished form at the grinding mill, is not usually bought for resale but is shipped direct to the consumer.

WILLARD H. COBB, for the past several years general factory manager, mechanical-goods plants, United States Rubber Co., has been appointed general manager of the mechanical-goods and general-products divisions.

Routine Sampling for Control of Atmospheric Impurities

A DEFINITE answer to the vexing question, "How clean is the air where your men work?" may be found through procedures given in a new bulletin just issued by Air Hygiene Foundation to its 250 member companies and associations. Air impurities cause much of the illness among heavy industry's 15 million workers.

The bulletin, *Routine Sampling for Control of Atmospheric Impurities,* was prepared by the Foundation's Preventive Engineering Committee, headed by Philip Drinker of Harvard. It lists proved methods of the collection and determination of, and apparatus for checking, 45 dangerous substances commonly found in industrial atmospheres, such as ammonia, arsenic dust, benzene, chromic acid, carbon dioxide, hydrocarbons, lead dust or fume, mercury, methanol, sulphur dioxide, etc.

Two steps are involved in checking the air of a workplace, the report explains, "first, measurement of air currents, and, second, estimation of impurities." The resulting data can then be applied to the design of control equipment or to checking the results brought about by such equipment.

After recommending procedures for both high and low air-velocity operations, the bulletin explains that for the purposes of selecting sampling and control methods, in relation to exhaust systems in plants or mines, several distinct types of atmospheric impurities must be considered:

(a) Relatively insoluble mineral dusts, such as silica, many silicates, and fly ash.

(b) Relatively soluble mineral dusts, like calcite (limestone).

(c) Finely-divided fume substances that are difficult to catch in water. Examples are lead, lead oxide, and zinc oxide.

(d) Dusts that may be affected by water. Examples are flour, leather, and soap. Many of these dusts are explosive if mixed with air.

(e) Aqueous mists, such as chromic acid entrained from electroplating baths, or condensate from vats of various sorts.

(f) Water-soluble gases, such as hydrochloric acid. Such soluble gases usually contain mist as well as gas, the proportions depending upon local conditions.

(g) Gases or organic vapors, like benzene, soluble with difficulty. These react slowly with most liquids but may be absorbed readily by solids, such as activated carbon.

The impinger is commonly used in sampling dusts, and occasionally mists and some gases. It is definitely unsuited to certain other gases like chlorine or organic vapors. It is not efficient against finely-divided fume substances, such as lead or zinc oxide, and rarely is it suited to sampling organic dusts.

For sampling finely-divided fume substances, like lead, a small electric precipitator gives accurate results. Barnes and Penney of Westinghouse Electric & Mfg. Co., have described a small precipitator which should be well adapted to field use and is now available. The various grab-sampling instruments give useful indications of changes in dustiness, but do not imitate the impinger in any way, so that it is impossible to convert impinger to grab-sample counts.

Most explosive dusts are affected by water, while some of them, especially organic dusts, such as flour, are difficult to wet. Explosive concentrations of all such dusts are very high as compared with dust concentrations of hygienic significance, so that explosive dusts are determined by weight rather than count.

Dust Analysis and Gas Sampling Methods.—In the case of all dusts the estimation of the sample taken from the air can be made by counting representative fractions under the microscope, or the sample can be analyzed by appropriate chemical methods, or the material can be weighed. The large impinger and the electric precipitator are equally well adapted to either procedure. The midget impinger collects, in reasonable sampling time, a relatively small amount of dust, but enough for counting. Dusts, like silica, that are troublesome to determine chemically, are generally counted, while those like lead, manganese, and cadmium are determined chemically.

Concerning light-field versus dark-field counting the bulletin says that for routine control work the relative advantages of these two methods—no matter what sampling instrument is used—are relatively unimportant.

Some gases and vapors, notably carbon monoxide, hydrogen sulphide, and mercury, in minute amounts, give strong chemical reactions which makes possible rapid estimations and, still better, continuous records of pollution. However, the great bulk of gases and vapors from organic solvents, such as benzene, carbon tetrachloride, and carbon disulphide, can not be caught efficiently unless sampled at slow rates, such as ½ to 1 liter per min. Some of them, such as benzene, can be absorbed directly in special solvents or adsorbants, like charcoal or silica gel, or can be converted into another compound which can then be estimated by an appropriate method.

Routine Checks and Recording of Air Impurities.—If control equipment has been installed, samples should be taken periodically for check-ups. This is the best way to tell whether the equipment is functioning as it should. If concentrations obviously are high, it is usually a waste of time to take the sample and to estimate it. To-day many plants operate crushing units and other dust producers at night to take advantage of reduced power rates and to stagger employment over 24 hr.

In the cases of some gases and vapors our sense of smell often makes possible the detection of gas concentrations which exceed desirable limits. Such a test is quite unreliable. One becomes used to even such dangerous or disagreeable odors as hydrogen sulphide in a few moments. It is, therefore, risky to estimate their strength by smell.

Such crude tests do not take the place of regular sampling technique. How often the routine samples should be taken depends entirely upon local conditions. In some places they are taken daily, while in others several times a year is enough. It is well to "play safe" and to take them too often rather than too seldom. The men quickly become used to such sampling and pay no attention to the procedure. Obviously, the sooner the sampler has the man's interest in his results, the better will be the outcome.

Samples should be taken wherever men work. It is a mistake to ignore places where one believes that there is no dust or gas. The samples are about the only proof that the employer can bring forth that he has taken proper precautions to prevent a disease, such as silicosis or a chronic poisoning from benzol. The mere statement that he or anyone else thought the atmosphere sufficiently clean is not enough.

Occasional photographs of various plant and mine operations are often of greater practical usefulness than are records of dust counts or of gas or vapor concentrations. As an exhibit on the company's bulletin boards photographs are effective warnings to the men to clean up.

Personal Mention

FRED BOLAND, who has been assistant superintendent of the Petoskey Portland Cement Co. plant at Petoskey, Mich., has been named superintendent to succeed the late E. C. Switzer. HAROLD TILLOTSON, chief engineer, and GEORGE KIRP, chemical engineer, will also hold the titles of assistant superintendent in the future.

JOHN KAIMON has purchased the concrete-block and burial vault business formerly operated by GEORGE SMITH at Mason, Mich.

HARLOWE HARDINGE has been elected president of the Hardinge Co., Inc.; York, Pa., succeeding H. W. Hardinge, who is now chairman of the board. F. E. FINCH has been made vice-president and secretary.

R. S. WHARTON, former general sales manager of the Quaker City Rubber Co. has been made vice-president in charge of sales, replacing F. C. MILLHOFF, retired. G. C. JOHNSON, former manager of the Chicago branch becomes general sales manager.

SAM R. RUSSELL, explosives technical representative of E. I. du Pont de Nemours & Co. addressed the Graduate School of Engineering of Harvard University on May 4 on the use of explosives in engineering construction.

GENE MCINTYRE, 727 W. 7th St., Los Angeles, has been appointed Lockseam Spiralweld pipe representative in California and Arizona by the Naylor Pipe Co. of Chicago. Mr. McIntyre has been associated with the petroleum and mining industries for many years in the mid-continent and south-western fields.

H. S. MATTIMORE, engineer of materials, Pennsylvania State Highway Dept., Harrisburg, Pa., is the new president of the Harrisburg chapter of the Pennsylvania Society of Professional Engineers.

STANLEY MICHAELSON, engineer in the mining division of Allis-Chalmers Mfg. Co., Milwaukee, Wis., has been transferred to the Salt Lake City district office as sales engineer specializing in mining and related machinery built by the company.

JOHN ECKERT, 78, died at his home in Wennersville, Pa., on May 4 after a long illness. He was one of the founders of the American Cement Co., later merged with the Giant Portland Cement Co. and is said to have built the first concrete road in Pennsylvania in 1904.

BIAGIO DONIO, 56, cement-block manufacturer at Linden, N. J., passed away a few weeks ago.

G. RAYMOND PRINCE, 43, well-known ready-mixed-concrete operator and head of the Prince Concrete Co., Camden, N. J., died recently. He served in the U. S. Navy during the World War.

PERRY P. QUAYLE, 57, treasurer of the Portage Gravel Co., Cleveland, O., died recently, the victim of a traffic accident in Cleveland. He was a native of Gates Mills, O.

ALBERT ELLIS WEBSTER, 59, assistant publicity manager of Universal Atlas Cement Co., with which company he had been associated for 15 years, died

MARMON-HERRINGTON *All-Wheel-Drive*

THE TRUCK THAT HAS

"WHAT IT TAKES"

ON CONSTRUCTION JOBS

● Most any good truck can give a satisfactory account of itself with ordinary loads on the broad, smooth level highway. But when loads are extra heavy, and deep, loose sand, mud or snow is encountered, even the biggest and best of conventional drive vehicles give up in futile wheel spinning, skidding and stalling. When extra steep and slippery hills are reached they simply can't make the grade.

Greatly Increased Traction

But here are trucks that are different. Different as day and night. Note the powerful *front driving axle* on the Marmon-Herrington *All-Wheel-Drive* pictured above. No wonder highway construction and maintenance men, logging contractors, pit, quarry and colliery operators call these the "going-est" trucks they ever saw!

With power and traction on *all wheels,* lower gear ratios, and other engineering advantages exclusive with Marmon-Herrington *All-Wheel-Drive* heavy duty vehicles and converted Fords, these vehicles have the ability to *go places and do things no other vehicles would dare attempt.* Let us send literature and prices. You will be amazed at the performance, as well as the money-making and money-saving possibilities in Marmon-Herrington *All-Wheel-Drives.* Cable address, MARTON, Indianapolis, Indiana.

MARMON-HERRINGTON COMPANY, INC.

INDIANAPOLIS, INDIANA, U.S.A.

suddenly April 22 at his home in Jackson Heights, Long Island, N. Y., to which residence he moved last fall from River Forest, Ill., where he had lived for many years. For a number of years before he joined the cement company he was interested in social service work and wrote several books and articles on that subject.

A. C. Bittner, 57, for 19 years manager of the service department of Hardinge Co., Inc., died April 22, at his home in Bellevue, Ia.

Joins Link-Belt Co.

Consolidation of Speeder Machinery Corp., Cedar Rapids, Ia., manufacturers of shovels, draglines and cranes, with the shovel division of Link-Belt Co., has been announced by Alfred Kauffmann, president of Link-Belt Co., Chicago.

Speeder Machinery Corp. will be operated as a subsidiary of Link-Belt Co. with the present management continuing to operate the business. T. M. Deal will continue as president. For the present each organization will continue to operate independently.

Announcing

960 PAGES of comprehensive data . . . a most complete reference book on the subject of chains, reduction and material handling machinery of all kinds. Contents are so arranged as to enable you to incorporate Jeffrey equipment in your plans with a minimum of effort and delay.

The coupon below is for your convenience (or make request on Company letterhead) . . . fill it in and mail.

The Jeffrey Manufacturing Company
917-99 N. 4th St., Columbus, Ohio

Please send me Catalog No. 87.

Name .....

Position .....

Company .....

Address .....

Occupational Diseases and the Law

Injuries

Casualty Underwriters v. Flores, decided by the Texas Court of Civil Appeals at Galveston, January 12, 1939; rehearing denied, February 23, 1939; reported at 125 S. W. (2d) 371. This was an appeal from an award of compensation on account of a death from lead poisoning. The controlling issue was whether the deceased died from an occupational disease or whether his death resulted from accidental injuries received within the scope of his employment. The former, under Texas laws, is not compensable in a proceeding under the Workmen's Compensation Act. The court, however, sustains the finding that death resulted from the inhaling, at a specific time, of an unusually large quantity of poisonous lead fumes, which caused his death, and that he died from accidental injuries and not from an occupational disease.

Silicosis

Brown v. St. Joseph Lead Co., decided by the Supreme Court of Idaho, December 21, 1938, and affirmed on rehearing March 9, 1939, reported at 87 Pac. (2d) 1000; followed in *Nixon v. St. Joseph Lead Co.*, decided and affirmed by the same court on the same dates, and reported at 87 Pac. (2d) 1007.

Under the Idaho Workmen's Compensation Law, Section 43-1810, Idaho Code Annotated, an occupational disease is not compensable, but compensation is awarded for injury from accident. In these cases the essential question for decision was whether, under the statutes and decisions applicable in Idaho, compensation could be awarded for injuries from silicosis as injuries from accidents or whether compensation should be denied on the ground that silicosis is an occupational disease.

According to the opinion written by the Court, the injured employees were employed in drilling and excavating rock with a high silica content. Wet drills, which were used when the State Mine Inspector made his visits, did away with the extremely dusty condition which otherwise prevailed, but when the Inspector left the mine the

use of wet drills was discontinued. The result of the use of dry drills, the inadequacy of the ventilation system, the resultant exposure to silicosis and the possibility that the miners would contract it, were found to have been known by the defendant company.

The Court finds that silicosis is in large part preventable by one device or another—by not permitting the silica dust to enter the lungs of the worker at all, or at least in such small quantities as not to be injurious—and that under Idaho law and under the circumstances involved in this case the employee did not suffer an occupational disease, "because an occupational disease is one which inheres in the particular employment and cannot by reasonable means be prevented."

As to accidental injury, the Court holds that the accident need not occur at one instant, but that "there may be repetitious causes all relatively slight which culminate and result in as serious and fatal an injury as though the disabling or lethal blow or incident occurred at one time."

The Court accordingly holds that the workers who contracted silicosis as the result of the use of dry drills and inadequate ventilation, in this case, were not suffering from an uncompensable occupational disease, and that compensation should be awarded for injuries resulting from accident. The contrary ruling of the Industrial Accident Board is reversed.

Common Law

Triff v. National Bronze & Aluminum Foundry Co., and *Smith v. Lau, d.b.a. Marion Brass & Bronze Foundry,* decided by the Supreme Court of Ohio, March 29, 1939, reported at 14 O. O. 48, 135 Ohio St. 191. Certain occupational diseases have been compensable under the Ohio Workmen's Compensation Law since 1921, but silicosis was not included in the schedule until the law was amended in 1937 (117 Ohio Laws, 268). These actions, involving silicosis claims, arose before the 1937, and the Court holds that in the applicable period, since compensation under the Workmen's Compensation Law was not provided, the plaintiff had a right of action at common law for injuries or death resulting from an employer's negligence. Two previous decisions to the contrary *(Zajachuck v. Willard Storage Battery Co.,* 106 Ohio St. 538, 140 N. E. 405, and *Mabley & Carew Co. v. Lee,* 129 Ohio St 69, 1 O. O 366, 193 N. E. 745, 100 A. L. R. 511) are overruled.

Pieczonka v. Pullman Co., decided by the U. S. Circuit Court of Appeals, Second Circuit, March 6, 1939, reported at 102 Fed. (2d) 432. This action was before the court after a second trial, and an earlier opinion of the court in the same case was reported at 89 Fed. (2d) 353. The plaintiff is administratrix of the estate of a deceased sandblaster whose death allegedly resulted from the inhaling of dust in his employment, in spite of partial use of a type of helmet supplied by the employer. The court follows its former ruling that the employer failed to supply the employee with suitable equipment, and that while the evidence would not support a recovery under the New York Labor Law, New York Consolidated Laws, Chapter 31, it would at common law.

The defense of contributory negligence and that of assumption of risk are held to have lain with the defendant (New York Civil Practice Act, Section 265), and the evidence is held not to have established either such defense.

Occupational Disease

Grain Handling Co., Inc. v. Sweeney, decided by the U. S. Circuit Court of Appeals, Second Circuit, March 6, 1939, reported at 102 Fed. (2d) 464. This case involved an award under the Federal Longshoremen's Act, 33 U.S.C.A. 901 *et seq.,* for disablement as a result

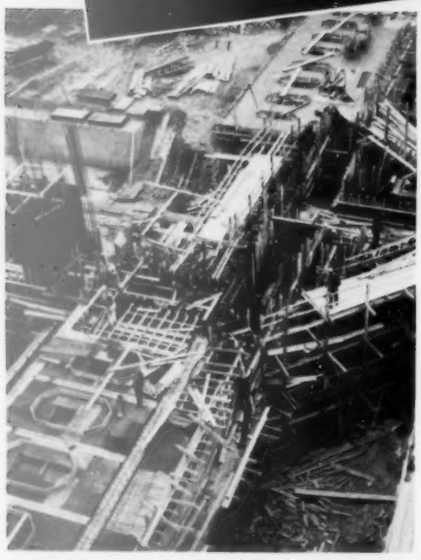
YOU NEED A DUST ARRESTING SYSTEM
PARSONS
NOW MAKES IT POSSIBLE FOR EVERY ROCK CRUSHING PLANT TO INSTALL A
Dust Arrestor
Recovers All Dust for Agricultural Limestone Purposes and Provides More Healthful Working Conditions for Employees

The dust generated in an average size Rock Crushing Plant can be handled with approximately 2000 cubic feet of air. The dust points are at the crusher, elevator and conveyor discharging into bins.
The PARSONS Unit Type Dust Arrestor, shipped assembled and complete with Fan and 5 HP. motor will efficiently handle this volume of air—overcome the dust nuisance—and at a cost within the reach of every operator—approximately $625.
The illustration at the left is of a PARSONS Unit Type Dust Arrestor with the fan and drive mounted overhead. Just set it in place and connect dust pipe into expansion chamber. You can't find anything more simple—yet as efficient.
PARSONS Dust Collecting Systems have been used by Rock Crushing and Cement Plants for more than 15 years. "It's Our Treat"—try one—if you like it keep it—if not send it back at our expense. Write for bulletin DA-6.

Dust Arrestors and Complete Exhaust Systems

PARSONS ENGINEERING CORPORATION
3595 E. 82ND STREET CLEVELAND, OHIO

SERVING AMERICA AT WORK
Cincinnati Conveyor Belts



Cincinnati Belts Convey Aggregate for Million Dollar Water Softening Plant at Flint, Michigan

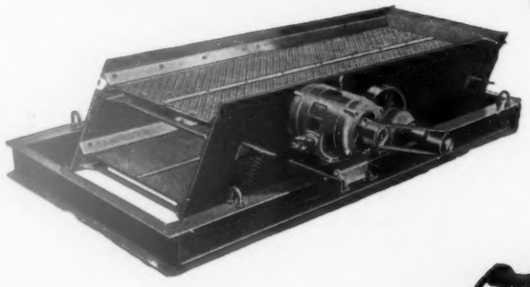
Cincinnati Conveyor Belts today are identified with many big work projects all over the nation . . . selected for grueling jobs because they have the stamina and endurance to handle the toughest assignments.

If you have sand, gravel, crushed rock, coal, etc., that require handling at minimum cost, try Cincinnati Conveyor Belts.

The Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio

CINCINNATI CONVEYOR and TRANSMISSION BELTS
HOSE · CHUTE LINING · SUCTION HOSE

NEW HOLLAND CIRCLE THROW SCREENS
Strike Out High Grading Costs
EVERY TIME!



New "CIRCLE THROW" action has plenty "on the ball"—lowers batting average of grading costs to bush league figures. Increases **quality** production of sand, gravel, aggregates. Full line of sizes.

This Roll Crusher likes *tough* opposition

A New Holland Roll Crusher reduces any rock material to required fineness at high rates of capacity. Output is doubled by patented pulsating feeder. Sizes for any production up to 100 tons per hour.

Write for Bulletins

NEW HOLLAND MACHINE CO., New Holland, Pa.

of fibrosis of the lungs. The claimant had had tuberculosis in 1918 as a consequence of influenza, and the disease had remained dormant until the claimant's employment as a grain scooper, working in a fine dust of grain.

The question for decision was whether the disability was an "injury" within the meaning of the statute, either an "accidental injury" or an "occupational disease." The court sustaining the United States Employees' Compensation Commission, holds that it was an "occupational disease." While it is necessary to limit the coverage of the statute to "diseases resulting from working conditions peculiar to the calling," resulting from "hazards greater than those involved in ordinary living," the court "can see no reason for limiting the protected class to those who have a normal resistance to such diseases, or for excluding those who are abnormally vulnerable." The fact that tuberculosis was dormant in the claimant did not therefore, bar recovery for disability due to fibrosis of the lungs resulting from claimant's employment in dusty conditions.

Traffic News Digest

RECENT I. C. C. DECISIONS

Crushed Stone.—To enable the Southern Railroad to meet truck competition the Commission in its twelfth supplemental report has modified its prior report in 177 I. C. C. 123 and 197 I. C. C. 215 so as to exempt from the provisions thereof the intrastate movement of crushed stone from Blair, S. C., to Newberry, S. C. The proposed rate is 50 cents a ton for a 35-mile haul. I. C. C. docket No. 22,109 rates on sand, gravel and crushed stone within the state of South Carolina.

In a number of cases which were joined relating to the shipment of crushed stone from production points within a distance of 46 miles from Buffalo, N. Y. to destinations in New York, Pennsylvania and Ohio the Commission has found the rates to destinations in Pennsylvania on the lines of the N.Y.C., N.K.P., C. & O., Erie and Penna. would be unreasonable to the extent they might exceed rates made on the basis of the West Penn single-line scale increased by 10 per cent. Other findings relative to prejudice and prefrence were to be remedied by the application of this basis. In applying the scale the distance was to be figured over the shortest routes composed of not more than three line-haul carriers over which carload traffic could be moved without transfer of lading. A prior order has been vacated effective July 15, the date on which the new rates are to be made operative. I.C.C. docket No. 28,020 General Crushed Stone Company v. A. & A. et al; sub No. 1 same v. same; sub. No. 2 LeRoy

Lime & Crushed Stone Corporation v. same; sub. No. 3 Gensee Stone Products Corporation v. same and No. 27,714 Buffalo Crushed Stone Company v. same.

Lime.—In response to Fourth section application No. 17,398 parties to C. & N. W. tariff I.C.C. 9,280 and others, have been authorized to establish and maintain rates on lime on the basis of the so-called 16,170 scale prescribed in 112 I. C. C. 7 with general increases authorized since that time without observing the long-and-short-haul clause of section 4. This relief is subject to the equidistant provision and the 50 and 70 per cent circuity limitations. I.C.C.F. S. O. No. 13,421

Sand.—The Commission has found the rates on industrial sand from Mapleton, Pa., to Elmira and Olean, N. Y. applicable on shipments moving since July 1, 1935 not unreasonable and has dismissed the complaint in I.C.C. docket No. 27,979 Thatcher Manufacturing Company v. Pennsylvania.

Sand and Gravel.—The Commission has modified its order relative to intrastate rates on sand and gravel in the state of Mississippi to permit publication of a rate of 35 cents a net ton on gravel from Crystal Springs to Jackson, Mississippi and a rate on sand and gravel of 60 cents a net ton from Hattiesburg to Gulfport, Mississippi. It has issued an order directing the railroads and other parties to appear on May 17, at Jackson, Mississippi to show cause if any there be, why the order dated November 8, 1938, should not be vacated as far as it applies to hauls for distances of 50 miles, or less. I.C.C. docket No. 28,051, increases in Mississippi freight rates and charges.

Whiting.—The Commission has issued an order requiring the railroads in New Jersey to establish rates on chalk whiting in intrastate commerce within New Jersey on a level corresponding to that which the Commission placed on interstate rates to become effective not later than June 15. No order was issued at the time of the decision to enable the New Jersey Commission to act if it so desired. Since it failed to act the present order has been issued. In I.C.C. docket No. 27,612, Intrastate rates on whiting in New Jersey.

EXAMINER'S REPORT

Amiesite.—Examiner John McChord proposes that the Commission find unreasonable to the extent they exceed the rates on amiesite established by the Commission in 172 I.C.C. 100, rates charged on processed asphaltic limestone, in carloads, from Margerum, Alabama to Fulton, Mississippi and that reparation be awarded in I.C.C. docket No. 28,111, Alabama Asphalt Limestone Company v. Mississippian Railway et al.

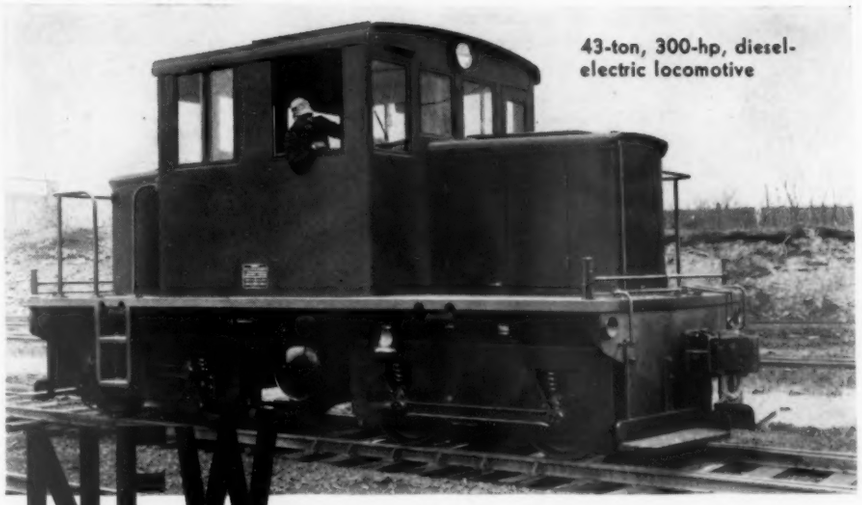
NEW COMPLAINT FILED

Sand and Gravel.—Alleging unreasonable rates, reparation is sought on a complaint involving sand and gravel from R. A. Junction, Ohio to destinations in Kentucky in a complaint filed by J. E. Marks, 112 South Upper Street, Lexington, Kentucky in I. C. C. docket No. 28,252 Codell Construction Company, Winchester, Kentucky, v. C. & O.

OTHER TRAFFIC NEWS

Rule 10 Revision.—A revision of rule 10 of the Official Classification has been agreed to by eastern traffic executives. The revised rule will provide that in mixed carloads shipped by one shipper on one day to one consignee at one destination will subject each item in the car to the carload rate on that commodity with the carload minimum weight being the highest applicable to any item in the car.

They're Sure-fire Cost-cutters

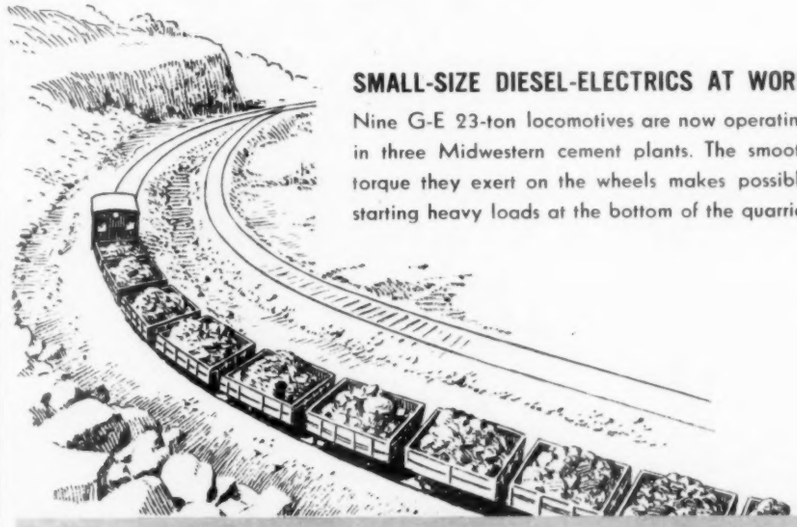


NEW SMALL DIESEL-ELECTRICS

THEY save money in fuel and maintenance costs. They reduce wear on cars and track because they run smoothly. They are easy to handle because of the simple electrical control. They are available for work most of the time. And now you can get them at the lowest prices in diesel-electric history.

General Electric has built a large number of these locomotives in the larger sizes for both railroad and industrial switching work, and the operating data obtained show that in most cases they pay for themselves in a remarkably short time.

Why not investigate the savings possible in hauling or switching work with our small-size diesel-electrics. Call the nearest G-E office and one of our representatives will be glad to talk this over with you. General Electric, Schenectady, N. Y.



SMALL-SIZE DIESEL-ELECTRICS AT WORK

Nine G-E 23-ton locomotives are now operating in three Midwestern cement plants. The smooth torque they exert on the wheels makes possible starting heavy loads at the bottom of the quarries

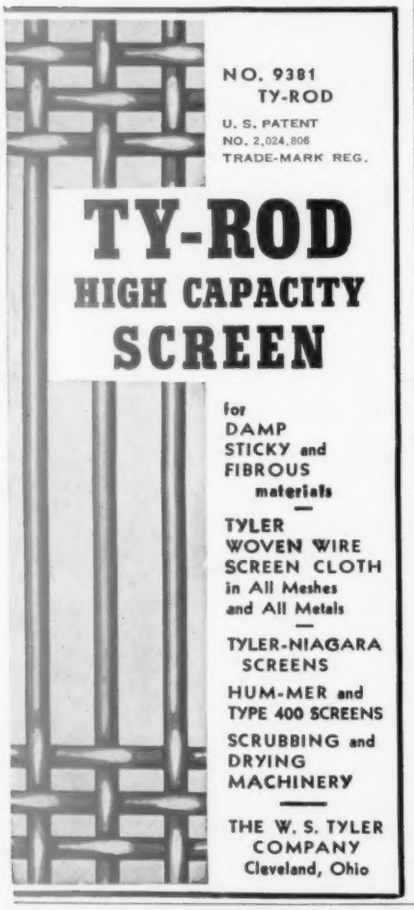
GENERAL ELECTRIC

250-37

Masonry Code Changed

The masonry section of the building-code in Toronto, Ont., has been considerably changed and the section governing the use of concrete blocks in residences and other buildings stiffened so that a higher grade of concrete unit will be demanded. The old 9-in. and 13¼-in. blocks will virtually disappear from the market, and standardization will be made on walls in masonry thickness of 8-in., 10-in., or 12-in.

Individual concrete blocks must now possess a crushing strength of 1,500 lb. per sq. in. compared with 1,200 lb. as heretofore.



Foreign Developments

Concrete Ties An Italian Economy

A type of concrete tie with which experimental stretches of the tracks of the Milan street-car lines have been laid is being tested by the Italian state railways. The possibility of the use of such ties is of considerable importance in the Italian national economy, for when the wood tie is used it is necessary to import from abroad:

wood, 0.088 cu. m. with a value of	40.00 lire
iron, 26.87 kg. @ 1.20 lire, amounting to	32.25 "
	72.25 "

When the reinforced-concrete tie is used, the necessary imports from abroad are as follows:

iron, 29.40 kg. @ 1.20 lire, amounting to	35.28 lire
coal, 8.64 kg. @ 0.30, amounting to	2.59 "
	37.87 "

the coal being, of course, the coal used in the manufacture of the cement.

Other economic comparisons show advantages for the reinforced-concrete tie of adequate design, especially on account of the length of life of the tie. —Alfredo Rosselli in *L' Industria Italiana del Cemento* 11:75-85, March, 1939.

Regularity of the Products of Grinding

It is natural to assume that the granular composition of powders produced by grinding would have a certain regularity and uniformity. That they sometimes do not, or do not appear to have, is to be attributed to various sources of error in determination, which are discussed. The formula of granular composition, $D = x^m/c^m$ is a valid formula; the exponent m is dependent on the method of grinding and the homogeneity of the materials being ground. It is shown that the granular composition of commercial cement follows the general composition formula. The value m has a particular significance for commercial cements, as an indication of the uniformity of the clinker material.—E. Szinger in *Zement* 28:231-237, April 13, 1939.

Studies of Strength Tests of Gravel

Since gravel is not made up of a homogeneous rock substance but a variety of minerals, the German standard test methods developed for the testing of stone are not (for the most part) appropriate for the testing of gravel. The test method designated DIN DVM 2109 (resistance of crushed rock to impact and compression) may be and in tests reported in this article was used for the testing of gravel.

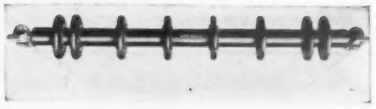
Compression tests were conducted with four different gravels as well as on a double-broken crushed basalt (10 to 30 mm. diameter) as a check and comparison. The gradation of 10 to 30 mm. diameter was such that a logarithmic scale yielded a straight screen curve. The compression amounted to 40 tons.

The results obtained were evaluated according to Abrams and Rothfuchs by means of the fineness modulus. If the resistance of one aggregate is taken as 100, the other aggregates may be assigned comparative figures on the results of the tests; in the tests reported here the basalt was taken as 100 and the gravels given quality index numbers in relation to it. The figures so obtained were found to accord with the actual variances in nature and strength of the various gravels.—Dr. W. Pickel in *Steinbruch und Sandgrube* 38:121-125, April 20, 1939.

PERFORATED METAL SCREENS
FOR SAND, GRAVEL
STONE, ETC.
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
Prompt
Shipment
CHICAGO PERFORATING CO.
2435 W. 24TH PLACE CHICAGO, ILL.
Telephone CANAL 1459

New Machinery and Supplies

The Robins Rubberdisc return idler, a new product of the Robins Conveying Belt Co., New York, N. Y., is ideal for use on any conveyor belt which handles abrasive, corrosive, damp, or somewhat sticky material. It is constructed of a steel tube shaft on which are mounted a series of tough and resilient rubber



The rubber-disk idler.

disks, spaced about 6 in. apart except at the ends where the last two are about 3 in. apart.

Within the steel tube there are mounted New Departure "lubricated-for-life" ball bearings, requiring no greasing or oiling and completely sealed against the entrance of grit or moisture. Due to the light weight of this idler and to the type of ball bearings used it turns very easily, thus avoiding slippage between the belt and idler and permitting the conveyor to start and operate with a minimum of power.

The resilient and flexible rubber disks and the open construction with the belt supported at only a few points instead of its whole width, makes this a self-cleaning idler. The slight deflection of the belt over the rubber disks and the slight deformation of the disks at the point of contact with the belt gives the idler an effective belt cleaning action. Conveyed material cannot build up on this idler.

Abrasion of both the belt and the idler is greatly reduced because of non-slippage and because there is much less wear in a rubber-to-rubber contact than in a rubber-to-metal.

• Tower Excavator

A 4-cu. yd. tower excavator is announced by Sauerman Bros., Inc., Chicago, Ill., enlarging the line of Sauerman tower excavators which now includes sizes from 2 to 10 cu. yd.

The new machine is furnished with a 4- cu. yd. Crescent scraper bucket and carries on the head-tower a Sauerman special two-drum hoist powered with either a 170-hp. gasoline engine or a 150-hp. electric motor. The head-tower usually is mounted on car wheels and the tail-tower on crawlers. A steel ramp, hinged to the front of the head-tower, permits the scraper bucket to drag its loads of material up to a small hopper which in turn discharges the material into cars or onto a belt or other conveyor. Scalping of oversize can be taken care of between the hopper and the conveyor.

As an example of the machine's handling capacity the manufacturer states that when excavating ordinary sand and gravel with the scraper bucket operating on an average haul of 200 ft., the hourly output is 170 cu. yd. This output increases, of course, if the haul is shortened, and decreases if the haul is extended.

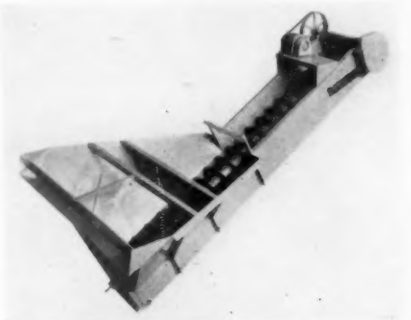
The Sauerman announcement emphasizes the adaptability of this machine for sand and gravel excavation and for any open pit mining of loose minerals, pointing out that a Tower Excavator has greater range of action than the standard form of drag-scraper machine which operates radially around a guyed mast or headpost.

Tower excavator with empty bucket returning to pit.

• Classifier

Recognizing the steadily increasing demand for closely-graded sands, the Smith Engineering Works, Milwaukee, Wis., has recently developed a new sand classifier. It dewaters, rewashes, and classifies sand, operating on the same principle as the well-known Telsmith sand drag. In order to secure closer gradation of fine and coarse sands, the water capacity is greatly increased and a larger screw is furnished, greater in length and with a spiral of shorter pitch set at a considerably steeper angle.

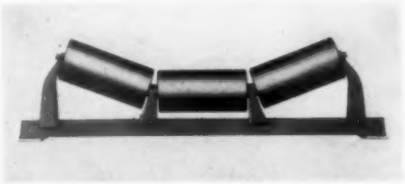
According to its designers, the new sand classifier not only produces a well-watered product, but is capable of handling larger water capacities. Water overflow velocity and size of finished product are regulated by a new type of quickly adjusted control.



Screw which dewaters and classifies sands.

The screw, of special abrasion-resisting steel, is mounted on a shaft, having a water-lubricated, cutless rubber bearing at the lower end, and combined thrust and radial Timken bearing at the upper end. All moving parts are substantially mounted in a steel box of special shape.

The new Telsmith sand classifier is made in single- and double-screw types with sand



Series 43 belt idlers, newly introduced by the C. O. Bartlett & Snow Co., Cleveland, O., have self-cleaning bases. The support brackets are assembled in jigs to assure proper alignment and correct spacing. Slotted holes are provided in the mounting plates to allow the making of any slight adjustments in aligning the belt. The idler rolls are machine faced on the ends and pressed onto the shoulders of the cast roll ends whose outer edges have been rounded and smoothed to prevent injury to the belt. The free-running anti-friction bearings are protected with labyrinth grease seals, and a through grease tube is provided from one bearing to the other.

CALOREX
REG. U.S. PAT. OFF.

BURNERS for LIQUEFIED and GASEOUS FUELS

Calorex Model R-2000 industrial rotary-cup, low-pressure air-atomizing type burner.

Backed by 50 years of experience, the Best organization is highly qualified to supply engineering service and industrial oil or gas-burning equipment especially suitable for dehydration service. Whatever your problem may be, feel free to consult us. Our engineering department is maintained for advisory service and is prepared to render drawings and supervision on furnaces and fuel-burning systems of all types.

W. N. BEST
ENGINEERING CO., INC.
75 West St., New York, N. Y.

CLIP MINUTES HERE

and cut your trucking cost

BUY QUALITY HAISS LOADERS AND SAVE $

5 yards a minute with the Haiss "135 Loader"—and no fooling. 24,000 pounds of all-steel digging and loading ability—with the drive of a 65 H.P. motor to give it POWER. Nothing flimsy—or cheap.

WRITE, WIRE OR TELEPHONE
HAISS
George Haiss Mfg. Co., Inc., 142nd St. & Rider Ave., New York

Who, for over 45 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Belt Conveyors—Buckets

TRI- VIBE

Leahy HEAVY DUTY Vibrating SCREEN

Like the triple play that cinches the game, the triple powered free-swinging screen jacket . . . which is the new TRI-VIBE feature . . . makes the LEAHY Type "C" No-Blind Vibrating Screen an easy winner in *fine screening* operations. It is dynamic Leahy differential vibration at its best . . . insuring increased capacity and uniformity.

Bulletin No. 14-H will be sent on request.

The Deister Concentrator Company
The Original Deister Co., Est. 1906
911 Glasgow Ave., Ft. Wayne, Ind.

ROGERS CRUSHERS

Are Good Crushers

10" x 36" Anti-Friction Bearing Crusher

7 REASONS WHY!

1—UNEQUALLED PRODUCTION (Users Report)
2—LOWEST MAINTENANCE COST (Users Report)
3—UNMATCHED RUGGEDNESS (Experience Shows)
4—LARGE CAPACITY BEARINGS (Failures Unknown)
5—LARGE DIAMETER ECCENTRIC SHAFT (Failures Unknown)
6—HEAVY, WELL PROPORTIONED CRUSHER BED (Failures Unknown)
7—DEPENDABLE AND LOWER PRODUCTION COSTS

(Results—Confirmed by Continued Repeat Orders)
Equipped with Bronze or Roller Bearings

ROGERS IRON WORKS CO.

Write for Bulletins Nos. 303 and 304
300-10th St.

CRUSHER BUILDERS FOR 40 YEARS

Give Us Details of Your Crushing Problems
JOPLIN, MO.

capacities from 10 to 60 cu. yd. hourly. The illustration shows the 20 in. by 15 ft. single screw, with a capacity of 25 to 30 cu. yd. per hr. of coarse sand.

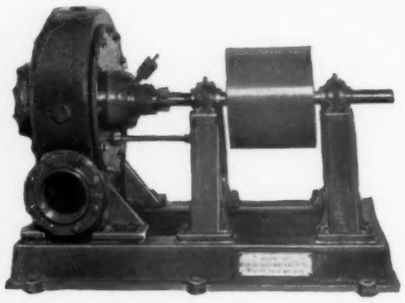
• Quarry Trucks

The Bluff City Lime & Cement Co. has added a fleet of four special Hug quarry trucks to its transportation equipment at St. Genevieve, Mo.

The trucks furnished are the special Quarry Model 92-U Hugs, each of which is equipped with a 7-cu.yd. water-level-capacity scoop-end body equipped with a Heil hoist. The body has a special heavy-duty reinforced bottom, ribbed I-beam side braces, and is of all-welded construction with canopy over driver's seat as an integral part of the body. Other features of construction of the Model 92-U chassis include the all-welded Hug I-beam frame, heavy-duty Buda 6-cyl. truck engine, 5-speed forward transmission, full-floating double-reduction rear axle, tread-plate front fenders and Hug set-back wheel design, which provides a short wheel-base and turning radius. The design of the front end on this chassis is especially adapted for quarry operations. The cowl, hood and radiator guard are of the armored type construction, affording maximum protection against falling stone and rock.

The Bluff City Lime & Cement Co. purchased its first Hug unit in November, 1937 and have added four more Hug units prior to the purchase of the four models described above.

Series R low-capacity, rotary-cup, low-pressure, air-atomizing type burner designed for industrial use and high combustion efficiency by the W. N. Best Engineering Co., Inc., New York, N. Y. Will handle any grade of fuel oil, residues and tars. The burner barrel is easily retractable and thus the spinner cup may be removed from its firing position without effort. The large capacity Series "R" burner has an operating range from 100 to 500 gal. per hr. Series "R" burners are available in sizes from 5 to 100 gal. per hr. capacity and from 100 to 500 gal. capacity. They can be furnished also for combination oil- and gas-burner service.



New anti-friction-bearing, low-head type sand pump being marketed by the Kansas City Hay Press Co., Kansas City, Mo. Heretofore the pump was available only with plain, babbitted bearings. Ball bearings are used on the 4-in. model while the 6-in., 8-in. and 10-in. pumps are supplied with self-aligning, tapered roller bearings.

• Portable Plant

Gravel-pit operators and others late last month had the first look at the new Telsmith dual portable crushing-screening-loading plant during a three-day preview at the Smith Engineering Works factory in Milwaukee, Wis. Visitors from Minnesota, Michigan, Illinois, Iowa, Ontario, Canada as well as Wisconsin saw the plant put through its paces, appreciatively noted the features which the makers pointed out as new and different—were inclined to agree with them when they said it was designed to meet every modern requirement of the operator.

Most notable of the features brought out were that the new Telsmith dual portable is reduced in weight, length and width—a statement which they substantiated by the figures —weight, 50,000 lb.; length 41 ft. 8 in. overall and width 8 ft. 10 in. overall. This reduction, the designers say, was accomplished by the use of a rotary elevator. However, they

Portable plant for crushing, screening and loading aggregates.

add that this was not a Telsmith invention but was early applied to portable rigs by the Yager Construction Co., of Fond du Lac, Wis., and Koplin-Kinas, of Green Lake, Wis., and is now being successfully used by seven Wisconsin contractors. Its efficiency as a means of reducing weight and bulk of portable outfits was the reason assigned by the designers for incorporating it into the new Telsmith Portable which they have kept compact yet rugged and yet completely equipped.

Telsmith engineers state that they have eliminated five chain drives in this plant and replaced them by belt drives to secure smoother, quieter operation and lower upkeep. In addition to its two crushers, a 9-in. by 36-in. roller-bearing Telsmith jaw crusher and a 30-in. by 18-in. Telsmith roll crusher, the plant (shown in illustration) includes a hopper with grizzly, plate feeder, four conveyors with anti-friction bearings, a 3-ft. by 10-ft. two and one-half deck Telsmith vibrating screen, rotary elevator, sand-reject conveyor, operator's platform with centralized controls which allow one-man control and operation, pneumatic-tired, roller bearing wheels, and Bendix brakes.

In addition to the plant illustrated and just described, the maker can furnish alternate plants equipped with, as extras, alternate arrangements of bin loading conveyors, and with field conveyor with swivel head. Descriptive literature will be mailed if you write to the manufacturer, Smith Engineering Works, Milwaukee, Wis.

• Carrier Rolls

Rugged carrier rolls, designed for heavy-duty service in handling all classes of materials that can be transported on belt conveyors, are being marketed by the McNally-Pittsburg Mfg. Corp., Pittsburg, Kan.

Timken roller-bearings for radial and thrust loads are both mounted in an accurately finished tubular housing assuring true alignment. Bearing cones are pressed on a ground and polished shaft for positive setting.

Each bearing is equipped with labyrinth and felt grease seal on the outer side sealing in the grease and assuring dust and grit protection. On the inside of each bearing is a grease seal which deflects the grease directly into the bearing without using abnormal quantities of grease for filling the tubular housing of the bearings.

Individual lubrication of each bearing insures positive greasing for that bearing instead of single-end lubrication which often gives surplus grease to one bearing and insufficient to the other, due to worn seals or clogged flow. High-pressure Alemite fittings and two-side lubrication are standard but one-side lubrication can be furnished.

Bearings are adjustable along the shaft and the shaft is adjustable in the brackets, insuring minimum spacing between the rounded edges of the rolls, giving protection against creasing and pinching of the belt.

The shells of the rolls are of steel tubing with heavy inserted cast ends shaped to centrifugally clean the roll ends of dust and dirt and throw this dirt away from the grease seal. The shell ends are spun over the casting giving a rounded edge to protect the belt.

Heavy cast ribbed brackets support the rolls in true alignment and give a rigid mounting for the carrier unit.

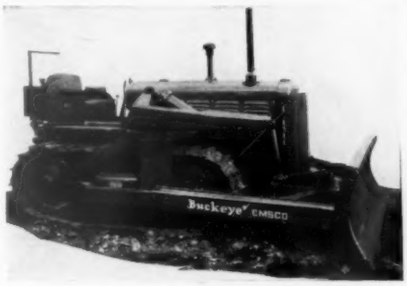
The 3-roll type, illustrated, is furnished with rolls of 5-in. or 6-in. diameters.

Heavy-duty conveyor rolls.

• Adds New Line

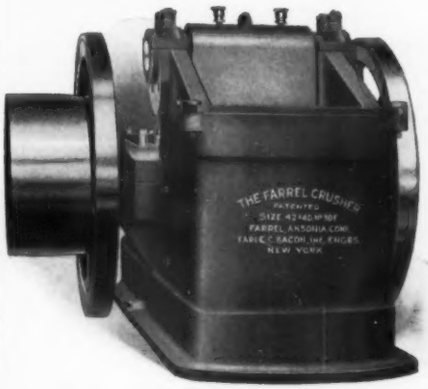
Buckeye bulldozers, trailbuilders, rippers and power-control units now have national and export distribution. These four equipment units, formerly manufactured on the West coast by the Emsco Derrick & Equipment Co., are now manufactured and distributed exclusively by the Buckeye Traction Ditcher Co., Findlay, O., under the trade name Buckeye-Emsco.

The machines will now be manufactured at Findlay, O., only and all distribution will be handled through the regular Buckeye sales organization. Exceptional manufacturing facilities for this equipment have been developed by Buckeye in building their popular line of Clipper convertible excavators with vacuum control, Buckeye surface-material spreaders, highway-widening machines, and Buckeye R-B fine-graders. The Buckeye Traction Ditcher



One of the tractor bulldozers.

FARREL BACON
CRUSHERS
Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service



EARLE C. BACON, Inc.
17 John St. New York, N. Y.

WE GAVE PIPE
a new twist

WE gave it this new twist a long time ago. It was the spiral twist—and it proved to be a revolutionary idea. The spiral seam gave light wall pipe greater rigidity and strength than it had ever had before. Year by year we have improved it—strengthened the seam; developed protective coatings for all services; broadened the range of sizes, wall thickness, and joints.

FOR your dredging lines, pontoon lines, sand and gravel lines, water lines and all similar services, this time-tested, but ever-modern pipe will handle the job at half the installed cost of any other type of pipe that you could use.

TAYLOR FORGE & PIPE WORKS
General Offices and Works: Chicago, P. O. Box 485—New York Office: 50 Church Street

TAYLOR

Spiral PIPE

ASK FOR CATALOG 36

SECO

Controlled Motion Vibrating Screens

▲

It is readily understandable why there can be no positively controlled motion of the gyrating body where there are resilient supports between the body and the base frame.

SECO does not use any such supports. The SECO is the only mechanically vibrated screen that has this control.

The patented linkage connection between body and base assures 100% equal vibration over the entire screening surface. That means capacity and efficiency.

Investigate SECO before you buy a screen.

▲

SCREEN EQUIPMENT CO., INC.
9 LAFAYETTE AVE.
BUFFALO, N. Y.

NAYLOR LOCKSEAM SPIRALWELD **PIPE**

. . . So we used NAYLOR Lockseam Spiralweld PIPE"

Experienced pipe users know Naylor is the *only* light weight pipe they can depend on for leakproof performance. Its exclusive Lockseam Spiralweld structure provides strength with light weight and leak-tightness for pressure air, water or vacuum lines. It means greater flexibility, safety and economy. Sizes 4" to 30" in diameter with all type fittings and connections.

WRITE FOR CATALOG NO. 37

NAYLOR PIPE COMPANY
1257 EAST NINETY-SECOND ST.
CHICAGO, ILLINOIS

Co. has built earth handling and excavating equipment for over 40 years.

• Portable Compressor

The Sullivan Machinery Co., Michigan City, Ind., makers of a large line of air compressors, announces the addition of a completely new line of portable air compressors known as the Zeph-Air. The new line features compact construction, self starters and refinement of other details to provide extreme mobility and ease of operation.

Two sizes are available with capacities of 60 and 85 cu. ft. per min., respectively, of delivered air. Although these compressors have capacity to operate concrete breakers and rock drills, they are so small and compact that the two-wheel mountings can be towed by a pleasure car and the skid-mounted models can be mounted in the body of standard pick-up trucks.

• Welding Hose

Condor Duplex welding hose, a development of the Manhattan Rubber Mfg. Division, Passaic, N. J., is a highly practical twin hose designed to make welding safer and more efficient than is possible with separate oxygen and acetylene lines.

In the construction of Condor Duplex, two hose lines are held together by a permanent web joint, integrally molded and having great strength and flexibility. The joint prevents tangling, kinking and snagging while the hose is in use. The ends are separated 18 in. for the torch end and 24 in. for the tank end for ease in making connections and in handling.

Condor Duplex hose may be obtained in either one or two braid, or in heavy duty braid and spiral cord construction, depending upon the working pressures used.

Features in the construction of the hose are strong inner tubes that are smooth and nonporous and tough, flexible covers that have a maximum resistance to abrasion and aging. Covers are furnished corrugated and colored red and green to distinguish the oxygen from the acetylene line.

In order to meet the demands of the new-type reversible hammer-mills, William C. Briggs, Elkins Park, Pa., has designed and is marketing a reversible, renewable-tip hammer. These hammers employ the same principle used in the single-face hammer which has been used by cement plants and other operators for a number of years, wherein centrifugal force locks the tip to the base. As the illustration shows the tips are in two pieces which are said to be solidly locked together when the mill is running and held in place by a single rivet when the rotor is stopped.

Trade Literature

Rotex Screeners. 40 p. (Bulletin 86) Orville Simpson Co., Cincinnati, O.

Equipment for Metallic, Nonmetallic and Associated Industries. 96 p. Allis-Chalmers Co., Milwaukee, Wis.

Safety-Pull—Ratchet Lever Hoists and Load Binders. 16 p. Coffing Hoist Co., Danville, Ill.

Rex Moto-Mixers and Agitators. 40 p. (Bulletin 340) Chain Belt Co., Milwaukee, Wis.

Air Cushion Valve Compressors. 12 p. (Bulletin 184) Pennsylvania Pump & Compressor Co., Easton, Pa.

Modern Automatic Packing and Weighing Machines. 4 p. Modern Valve-Bag Co., Allentown, Pa.

Drill Steel Sharpeners and Oil Furnaces. 4 p. Ingersoll-Rand Co., New York, N. Y.

Power and Traction for Mines, Pits and Quarries. 12 p. Caterpillar Tractor Co., Peoria, Ill.

Fluidometer . . . Completely Nonmanual Control for Measuring Liquid Batches. 4 p. Brayer Instrument Co., Buffalo, N. Y.

Diesel Powered Electric Generators. 10 p. Caterpillar Tractor Co., Peoria, Ill.

Special Applications of the Schaffer Poidometer. 4 p. Schaffer Poidometer Co., Pittsburgh, Pa.

ANW Cable for Moist Locations. 4 p. American Wire & Cable Co., New York, N. Y.

Feinc Filters in the Chemical Processes. 8 p. Filtration Engineers, Inc., Newark, N. J.

Syntron Electro-Magnetic Vibrators. 6 p. Syntron Co., Homer City, Pa.

Trailer Mounted Crushers. (folder) Universal Crusher Co., Cedar Rapids, Ia.

When *This* HI PLOXSIVES

Marks the Spot

It means another blasting job will "Proceed as Scheduled"

POWDER NATIONAL COMPANY

You can rely upon NATIONAL "HI-X-plosives" for maximum economy and sterling performance.
"National" now offers six new special AMMONIA DYNAMITES and two more high stick count gelatin types.
Permissibles, Nitroglycerine, Gelatin, Ammonia Dynamites, Flo-Free Dynamites

Blasting Supplies
Our TECHNICAL SERVICE is available upon request.

Write for information

NATIONAL POWDER CO.

Executive Offices
DUKE CENTER, PA.

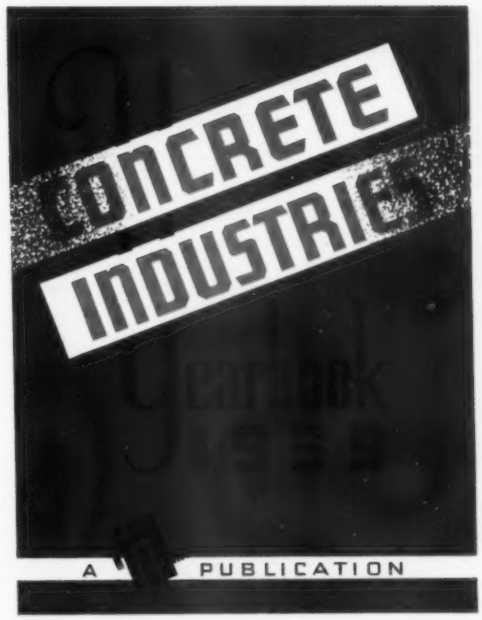
Plant and Sales Offices
ELDRED, PA.

PIT AND QUARRY Special Section

PROFITABLE NEW PRODUCTS

Making a "Hit" with Concrete Products and Ready-Mixed Operators

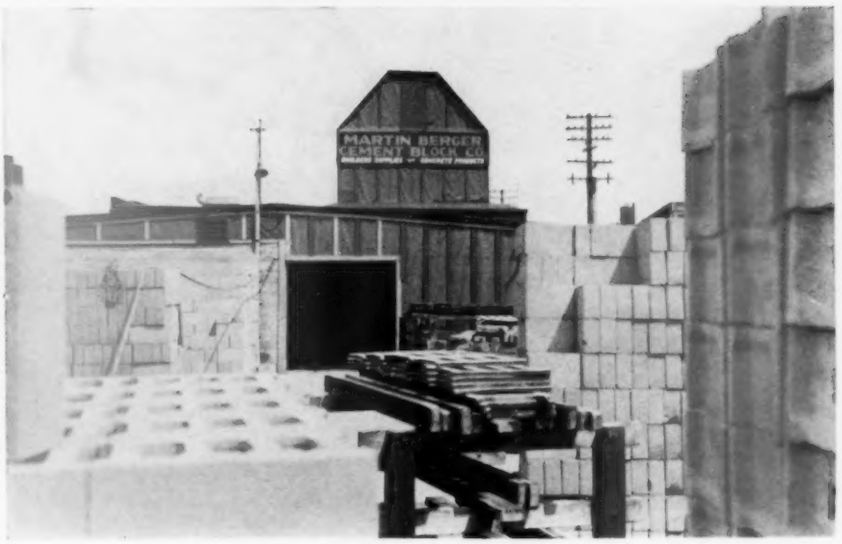
Everywhere, operators of concrete-products and ready-mixed concrete plants are enthusiastic about *Concrete Industries Yearbook,* published for the first time this year by Pit and Quarry Publications. Distributed free of charge to all worthwhile operating concerns in these industries, this 80-page book, crammed full of valuable production advice and merchandising ideas, has been extremely well received. Here, in a single volume, producers have available a complete, illustrated operating handbook containing descriptions and catalog pages of available equipment. The editors are already at work planning a revised and even larger edition for 1940. If, somehow, you failed to receive a copy this year it is not too early to request (on your company letterhead, of course) your copy of the 1940 edition. Manufacturers of machinery and equipment used in these industries are also urged to consider the worthwhile advantages of cataloging their products in this important medium of high reader interest.



Concrete Industries Yearbook contains two chapters—"Concrete Units" and "Ready-Mixed Concrete." The section on "Concrete Units" covers the manufacture and marketing of concrete-masonry units as well as pipe, tile, burial vaults, ornamentals, etc. It was prepared by Pit and Quarry's assistant editor, Harry F. Utley. The section on "Ready-Mixed Concrete" was written by H. F. Thomson, vice-president, General Materials Co., St. Louis, Mo., while Hayden Brooks of the Brooks-Taylor Co., Birmingham, wrote the treatise on lime putty.

PIT AND QUARRY PUBLICATIONS

538 South Clark St. Chicago, Ill.



By HARRY F. UTLEY

LEFT—View in the storage yard of the Martin Berger Cement Block Co. plant in Detroit. BELOW—The power-driven tractor which handles the racked blocks.

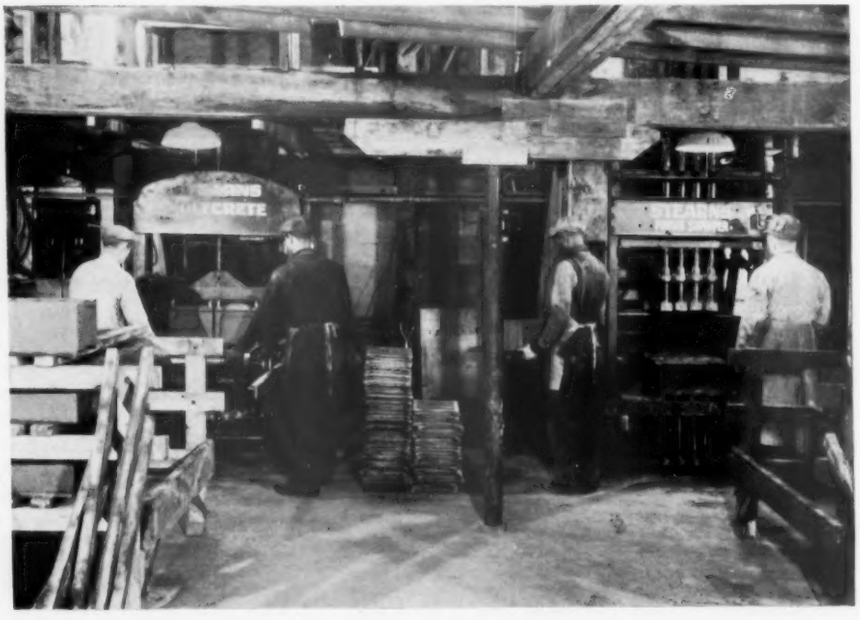
Blocks Handled Rapidly and at Low Cost With Gasoline-Powered Unit

ABOUT 75 per cent. of the output of the Martin Berger Cement Block Co., Detroit, Mich., is sold through building-material yards in Detroit and vicinity. These dealers and the architects and contractors they serve keep in close touch with developments in the concrete-block field and are quick to demand newer, better products. The Berger concern, through its fourteen years of existence, has always tried to provide the finest product it was possible to manufacture. With vibrated units gaining in popularity and demand, the company last fall installed a Stearns No. 9 Joltcrete machine and the units being produced have proved genuinely satisfactory. The company also continues to operate its Stearns power stripper to augment production on the Joltcrete, and to manufacture rock-faced units which can not satisfactorily be made by the vibration machine.

Aggregates are purchased from the Ferryview Sand & Gravel Co., whose pit and plant are located 22 mi. distant at Rochester, Mich. Dump trucks haul the sand and gravel to the Berger plant, located near the Detroit Municipal Airport just off Gratiot Ave., dumping into a hopper from which a Link-Belt elevator carries the material upward to two 30-cu.yd. bins. Cement is purchased in cloth bags, trucked in, and stored on the mezzanine mixing floor, to which it is transported via a chain conveyor.

There are two mixers, both of the continuous-mixing type. The older model is a Kent No. 2 with a capacity of 5 cu.yd. per hr. which feeds the stripper. The other, installed at the same time as the Joltcrete to serve that machine, is a Kent No. 2½ with a rated output of 8 cu.yd. of rammed concrete per hr. Aggregates are fed to the mixers by gravity from the overhead bins and one man can usually take care of both mixers, including the handling of the cement.

The Joltcrete machine meets, and exceeds, its rated capacity of 9 standard 8-in. by 8-in. by 16-in. units per min., turning out about 550 per hr., 150 units being produced from a barrel of cement. The stripper has about one-half the capacity of the vibration machine and, being an older machine and of the tamp type, is not quite as economical with cement but does produce about 100 blocks per bbl. The units from both machines pass all building-department tests by a comfortable margin, the Detroit code requiring a minimum of 700 lb. per sq.in. Blocks from the Berger plant usually develop the required 700-lb. strength after 5



The vibration machine recently installed and the power stripper.

PROFITABLE NEW PRODUCTS

A view in one of the two curing rooms. Inset at lower left shows a sketch of one of the fog nozzles used to produce moisture.

days of curing, but are never shipped until 14 or more days after manufacture. Generally they are allowed to cure in the yard for three or four weeks.

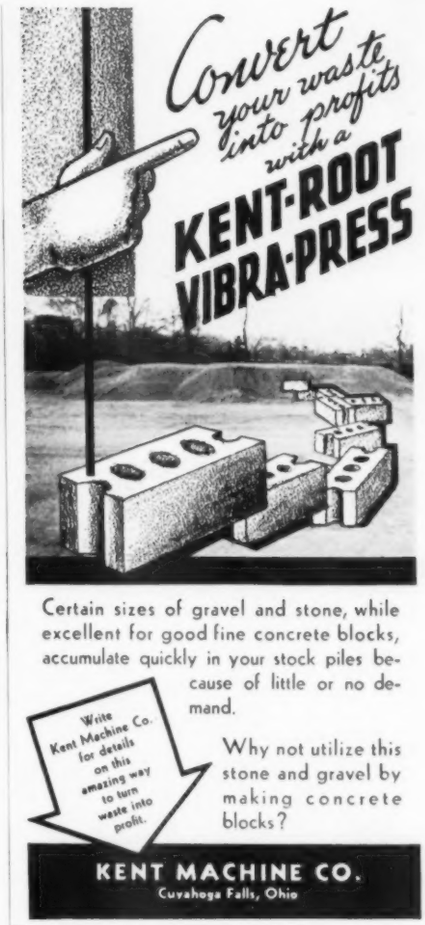
Wooden racks are used, and in handling these a fast, labor-saving machine, known as the Clark Truc-Lift, is now in service. This is a gasoline-powered hoisting vehicle, with which one man handles all the racked units both into the curing rooms and out in the yard with time to spare for other duties as well. Formerly, three hand-lift trucks were employed and two men have thus been released for other service about the plant. The operator of the Truc-Lift is quite proficient and handles the racks with accuracy and dispatch. The machine has a platform 5½ ft. long and 30 in. wide and has a lift of 4½ in. It can travel 6 mi. per hr., uses very little fuel and is saving the company $7 or $8 daily.

Newest and largest of the two continuous mixers which feed the block-machines.

There are two curing rooms, each being closed with tight-fitting tarpaulins. One has a capacity of 1,950 units, the other 1,450. Steam is used for heating, and the curing moisture is produced by special fog nozzles which were first used in the Berger plant and have already been adopted by a number of other concrete-units producers in the middle west. Manufactured by White Showers, Inc., of Detroit, they were originally designed for greenhouse use and for freshening vegetables and fruits in retail establishments. They produce an ideal foggy mist for curing and are easily tapped into pipe-lines in the curing room. The moist-curing time varies from 10 to 20 hr., depending on weather conditions, after which time the units are moved to yard storage.

The company also uses two Multiplex hand-operated machines for making flue blocks, while sills, lintels and other building specials are cast in molds of its own manufacture. Deliveries are made by a fleet of 6 Chevrolet trucks, the average haul being about 5 mi.

The concern was founded by the late Martin Berger, the business now being operated by his two sons, Raymond and Martin, Jr. The former acts as general manager of the company. The Bergers are active in the affairs of the Greater Detroit Concrete Products Assn., which sponsored a successful all-concrete demonstration house last year. In May of this year the association engaged an aggressive paid secretary to direct its activities in the person of Pierce E. Wright. Mr. Wright for years handled industrial relations for a group of Detroit contractors and he will doubtless prove valuable to the concrete-block producers in the general promotion of their product as well as in improving the existing price scale, the standard 8-in. unit retailing in the Detroit area for but 10c.


Convert your waste into profits with a
KENT-ROOT VIBRA-PRESS
Certain sizes of gravel and stone, while excellent for good fine concrete blocks, accumulate quickly in your stock piles because of little or no demand.
Why not utilize this stone and gravel by making concrete blocks?
Write Kent Machine Co. for details on this amazing way to turn waste into profit.
KENT MACHINE CO.
Cuyahoga Falls, Ohio

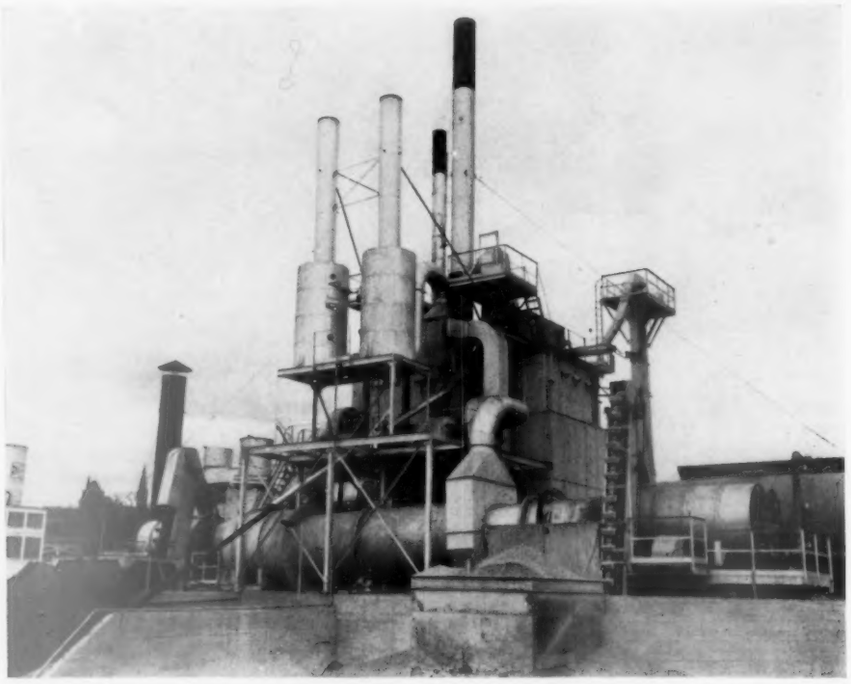
Canadian Sales Decline

Canadian sales of structural materials aggregated $31,147,000 in 1938, compared with $34,869,699 in 1937, a decline of 11 per cent.

Clay products were off 7 per cent. in value to $4,210,000; cement sales totaled 5,474,755 bbl. valued at $8,241,000, compared with 6,168,971 bbl. valued at $9,095,867 in 1937; sales of lime at $15,514,000 were 11 per cent. less. Taking the sales of clay products, cement, and lime as a base to compare with those of last year in relation to stone and sand and gravel, it was estimated that sales of stone and sand and gravel in 1938 were about $15,514,000.

The Buell Engineering Co., New York, N. Y., and the B. F. Sturtevant Co., Boston, Mass., have completed arrangements whereby the Sturtevant field organization, operating out of the 40 Sturtevant offices, will parallel the work of the Buell service staff, thus greatly increasing service facilities on Buell dust- and fly-ash collectors.

Automatic Control, Electric Heating Featured in New Bituminizing Plant



The Corson & Gruman asphalt plant with aggregate storage in foreground. Above are the dry and wet dust collectors.

WHEN the Corson & Gruman Co., Inc., Washington, D. C. recently decided to build a new plant to supply the rapidly-growing demand for bituminized aggregates in that city, only the most modern and efficient methods and equipment were considered. After due deliberation a McCarter Iron Works plant was selected and, largely through the efforts of the Potomac Electric Power Co., it was decided to do the bitumen heating electrically.

The wisdom of the company's choice is evident from the following figures. Over a 3-month period, this plant with 288 kw. of electric-heating equipment, produced 11,800 tons of bituminized aggregates. During this period the heating equipment consumed 83,000 kw.-hr. of electricity at a cost of $1,376 for heating the bitumen. This gives 12 c. per ton as the heating cost compared to the 32-c. per ton cost of heating by steam in the old plant. This steam was produced by an oil-fired boiler using 3-c. oil. Over a one-month period 6,578 tons of asphalt mix was heated at a cost of 6.2 c. per ton, the lowest figure yet reached.

The entire plant used a total of 112,300 kw.-hr. in the 3-month period for all purposes, including heating, for lighting the plant, offices and shop, and for power for 461-hp. in motors. With a rate on electricity running from 0.7 c. to 1.3 c. per kw.-hr., depending on the amount used, and a demand charge averaging $125 per month, the total cost of electricity was $2,036.00 for this period. The total electrical cost per ton of product was 17 c.

The company is justly proud of its share in building the street and parkway system in Washington which ranks with the best in this country. An example of the progressive spirit which pervades this organization is the fact that it keeps in touch with and uses the latest findings of such organizations as the U. S. Bureau of Public Roads, the U. S. Bureau of Standards, the local highway and testing departments, the National Crushed Stone Assn. and the National Sand & Gravel Assn.

The Corson & Gruman Co. was organized in 1920 by E. A. Corson, W. A. Gruman, and Edward Costigan. Both Mr. Gruman and Mr. Corson had been contractors and Mr. Costigan had been in the asphalt-block and tile business for many years. Mr. Corson dropped out of the business in 1924. At that time Mr. Costigan became president and treasurer and Mr. Gruman became vice-president and secretary, and both have continued in those offices. The company also takes contracts for street paving, park-drives, walks and allied types of construction. Some time ago the company built part of the well-known Skyline Drive using mixed-in-place bituminous concrete. In its work the company uses 12 Ford dump trucks, 3 compressor trucks, and 3 Jaeger 3½-cu.yd. concrete mixers on G.M.C. trucks with Thornton rear axles.

The original plant was built in 1920 at 33rd and K Streets on the Potomac River on the same site as the new plant. At that time sheet asphalt pavements were the only plant mix type used in Washington.

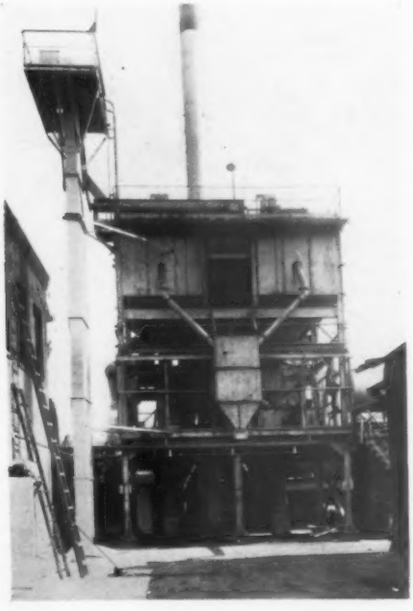
Crane with ¾-cu.yd. bucket unloading sand from barge on Potomac river to plant storage.

The cold type of plant mixes began to find their place about 1925 and it was necessary to erect another plant to mix this type pavement. These plants continued in use until 1937, but, for some time previous to this, much thought had been given to building a plant not only to produce paving mixtures at a minimum cost per ton, but to produce the best in those mixtures. It was known that proper grading of materials was necessary but had not been accomplished with the cylindrical screen. In drying aggregates for cold mix, it was not only essential to dry but also to cool the material within the same drier. In the hot mix drier it was necessary to maintain a constant temperature at all times.

One of the two mixers with scales, fluid meter and control valves.

The new plant, which went into operation in 1938, is actually two complete plants with individual driers, bins, batchers, mixers, etc. So compactly are these plants designed that they occupy little more space than would be required for a single plant.

Each unit, equipped with a 2-ton McCarter pug mill mixer has a capacity of 800 tons per day for either hot or cold mix. The units are so arranged that both can produce one type mix at one time giving a production of over 1,500 tons per day.



A view of plant before it was inclosed showing arrangement of equipment.

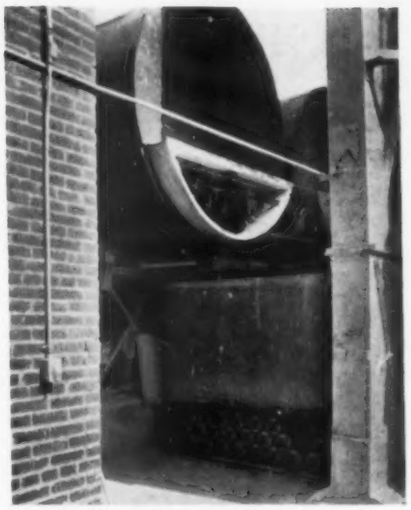
Electric heating and full automatic control of batching and mixing are outstanding features, with electric heated jackets for both mixers and asphalt bucket. The entire plant is of rigid steel construction with concrete foundations and footings and is as nearly fireproof as an asphalt plant can be.

The aggregates used in this plant—sand and crushed stone—are received in barges. The sand used is the Potomac River sand, containing as much as 12 per cent. moisture, and it was principally due to this fact that extreme care had to be taken in the selection of the new plant.

A P & H electric crane with a ¾ cu.yd. Owen bucket unloads these materials to stock-piles or into separate 2-compartment steel bins for each of the two rotary driers. Link-Belt apron-conveyors feed the aggregates from these bins to Link-Belt chain-bucket elevators which drop them into the two 6-ft. by 40-ft. McCarter direct-fired rotary driers. These driers are of the patented telescopic type, with combustion chambers at either end and an outlet housing for air and gases at the center. Under this system all moisture is removed from the aggregates in the center of the drum, giving ample chance for either cooling or superheating in the discharge end, for the production of cold or hot mix respectively. The driers are fired with fuel oil by Hauck burners. Air is supplied by Spencer blowers. SKF heavy-duty self-aligning bearings are used on the drier drive and trunnion rolls.

View of plant showing driers, fans and dust collectors.

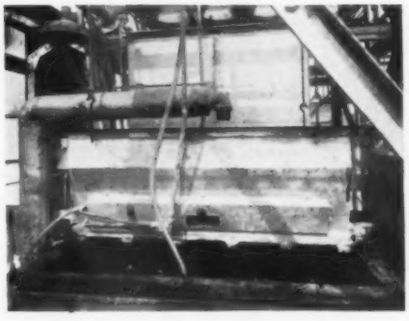
The draft for each drier is supplied by a Buffalo Size 60 fan from which the air and dust are discharged into Multiclone collectors. Although these collectors remove most of the dust, the location of the plant in a thickly-settled industrial and residential district makes necessary more nearly complete protection, which is provided by two Ducon wet dust-collectors.



Arrangement of heating elements in one of storage tanks and a superheater.

The product of each drier is discharged into the boot of an individual inclosed chain-bucket elevator. Each elevator feeds a fully-inclosed 4 ft. by 8-ft. Nordberg Symons screen. Each screen produces sand and three sizes of crushed stone which are discharged into individual 60-ton steel bins with four compartments each.

Limestone dust is received in bulk by railway and is unloaded from box-cars by an electric power scraper on a short belt-conveyor into a storage room with a capacity of two carloads (60 tons). The dust is reclaimed from this room by a screw-conveyor in the floor. A second screw-conveyor feeds an inclosed bucket-elevator, and a screw-conveyor at the top of the plant discharges the dust into a small bin between the two aggregate bins.



One of the bitumen weighing buckets with electric heater attached.

Bitumen for the asphalt plants is received in tank trucks from a refinery 40 mi. away. As this material is delivered hot no heating is required for unloading, and it is pumped through electrically-heated pipe-lines to three 10-ft.

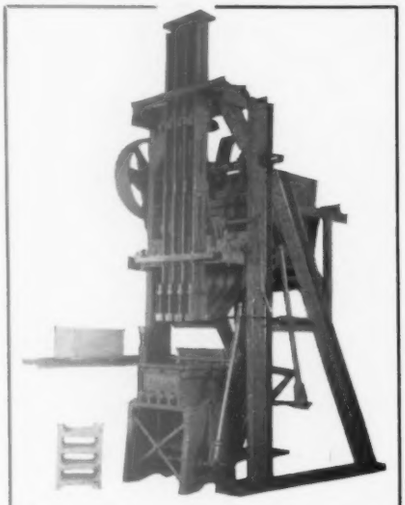
PROFITABLE

UNIVERSAL
Concrete Pipe Machine
"A BUSINESS SETUP"

Performance records of this "all-purpose" machine are a real convincer. Makes **quality** pipe, economically, in an average market range of sizes. Insures the maximum return per dollar invested—gives the limited investor a direct lead to an independent, profitable business.

Write for Information

UNIVERSAL CONCRETE PIPE CO.
COLUMBUS OHIO



An All-Purpose Machine

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager Columbus, Ohio

Main electrical control room for both plants.

diameter horizontal all-welded cylindrical steel tanks, two of 15,000-gal. and one of 10,000-gal. capacity. These tanks are insulated with 85-per cent. magnesia blocks and rest on concrete foundations. Each of the two 15,000-gal. tanks has twelve 3-kw. electric heating elements extending horizontally into the tank from one end. The 10,000-gal. tank has ten such elements. These elements are encased in tubes from which they may be readily withdrawn from the outside of the tank.

The heating elements are automatically regulated by means of Bristol thermostats and dial thermometers. They keep the temperature of the bitumen around them between 225 and 250 deg. F. so that it will flow freely by gravity through a valve above the elements into the two superheaters. These are square insulated tanks of 4,500-gal. capacity each. Each is equipped with twenty-four 3-kw. heating elements located near the bottom and arranged in three horizontal tiers. Recording thermometers and thermostats register and control the heat of the bitumen within limits of 260 deg. and 280 deg. F. for cold-mix asphalt in one super-heater and of 260 deg. F. and 300 deg. F. for hot-mix asphalt in the other.

In both the storage tanks and the superheaters the elements are connected in pairs and each pair has an individual switch so that any even number of elements can be used as desired. When rapid heating is desired, all the elements are used. For steady operation it has been found more economical to use only a sufficient number of elements to keep the temperature at the desired level. The current is then automatically turned off and on by mercoid switches operating magnetic switches to keep the temperatures within the predetermined limits. Using the smallest possible number of elements keeps down the electrical demand.

One of the main advantages of electrically heating the superheater is the fact that its contents are kept hot overnight or over week-ends at low cost as off-peak power is used. This accurate method of control also prevents overheating and the consequent deterioration of the bitumen which would reduce the penetration of the asphalt.

Bitumen is pumped from the superheaters through electrically heated pipes to the weighing buckets. These pumps are submerged in the bitumen with their intakes between the heating elements and are consequently at the same temperature. They are driven through vertical shafts by reversible 7½-hp. electric motors mounted above the superheaters. Each pump has a separate pipe-line feeding the two buckets and any excess bitumen overflows from the buckets back into the heaters. When the plant is shut down these pumps are operated in reverse long enough to clear out the feed line.

The two McCarter "AC" bitumen-weighing buckets are stationary and discharge into the mixers through dual perforated sliding gates. These gates are operated by a Vickers hydraulic system. Each bucket has a 4-kw. thermostatically-controlled electric heater welded to its side. With this system it is possible to move the naphtha line to the center of the mixer in order to get a better distribution. The naphtha used is metered.

Aggregates are discharged from the bins into the two weighing batchers through hydraulically-operated roller-type gates. Both the asphalt buckets and the aggregate batchers are equipped with Kron dial scales. A separate set of levers at each mixer operates these gates and the discharge of these batchers and the asphalt buckets is controlled by hydraulic levers. These systems can also be operated automatically by time-lock devices on pre-determined mixing schedules. The two McCarter pug-mill type mixers are equipped with 12-kw. electric heaters welded to their sides. Thermostats automatically maintain the correct temperatures in the mixers. The mixer discharge gates are operated hydraulically by a motor-driven oil pump and gate cylinders. The mixing floor is connected to the dust-collecting systems already described. All truck-loads of material are weighed on a Fairbanks scale with a Howe Weightograph.

Each piece of machinery in this plant is driven by an individual electric motor. Chain drives are used for the three feeders, the two drier-feed elevators, the three inclosed elevators, and the two driers, which are driven by 5-hp., 7½-hp., 15-hp., and 40-hp. motors, respectively. The two fans are driven through American Pulley Co. Wedge Belt V-belt drives by 35-hp. and 40-hp. motors. Each mixer is driven by a 75-hp. motor through a Link-Belt reducer, a Link-Belt silent chain and gears.

This plant was designed, built and erected in its entirety by the McCarter Iron Works, Inc., Norristown, Pa., and all equipment not of their own manufacture was made according to their specifications.

LEFT—The portable concrete-mixing plant with truck at left discharging aggregates into hopper feeding elevator. BELOW—The discharge side of plant with tower and hopper for loading buggies in foreground.

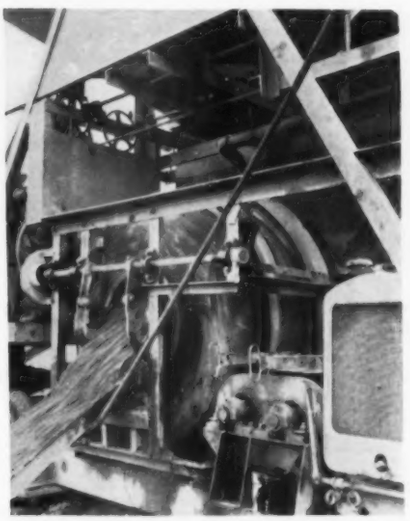
Portable Concrete-Mixing Plant Adaptable to Varied Service

MANY producers of ready-mixed concrete have found it advantageous to operate portable batching plants to supply building jobs not within economical reach of their stationary plants. Descriptions of some of the many such units have been published in PIT AND QUARRY. With all of these plants, however, the actual mixing was done in truck mixers which delivered the concrete to the job. A new type of plant, known as the Strayer portable concrete plant, has now been developed by the Erie Steel Construction Co., which both batches and mixes the concrete. This can then be delivered and placed in the manner best suited to the individual job. Such a plant offers interesting possibilities to contractors, ready-mixed concrete producers and to aggregates producers located in areas which could not support a stationary ready-mixed concrete plant.

One of the first plants of this type was purchased by Chas. B. Johnson & Son, Inc., general contractors, of Chicago, Ill., and is being used in the construction of the West Senior High School at Rockford, Ill. This is a $1,000,000 project and the Johnson company holds the general contract. About 11,000 cu. yd. of concrete are involved and nearly 2,000 cu. yd. have been poured since early in April when the plant was put into operation. Footings and basement columns and walls are now nearly completed and pouring of the first and basement floors will soon begin. The plant will be used intermittently as concrete is required, and will supply all of the concrete except for a few small isolated pours.

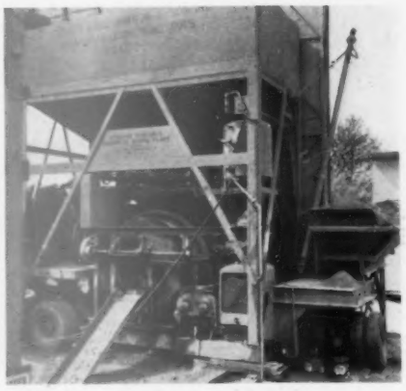
This plant is now set up at one end of the building site but when pouring is to begin above the first floor level it will be moved to a point near the center of the building. Aggregates are received in trucks which back up the plant ramp and discharge into a hopper. An elevator feeds the coarse or fine aggregate, as the case may be, into the two-compartment plant bin which holds 12 cu. yd. of gravel and 8 cu. yd. of sand. The aggregates are discharged into a ¾-cu. yd. weigh batcher with a two-beam scale and the required amount of cement is dumped from sacks on top of the aggregates. These ingredients are discharged into the ¾-cu. yd. mixer. Water is added from a syphon-type measuring tank above the mixer.

Operations are controlled from a platform at the rear of the plant where levers for the batcher, bin-gates, water tank, mixer, etc., are in easy reach. A 32-hp. Hercules gasoline engine with a Twin Disc clutch operates the mixer and elevator, each of which also have individual clutches. This engine also furnishes the power for setting up and taking down the elevator, the ramp and other equipment.



The plant mixer with some of plant controls in background. At right is engine which operates plant.

A hoisting tower is being used in connection with this job as it will be a 3-story structure. The concrete is discharged from the mixer through a chute into the bucket. A hoist operated by a gasoline engine elevates the bucket from which the concrete is discharged into a hopper. The bucket holds one



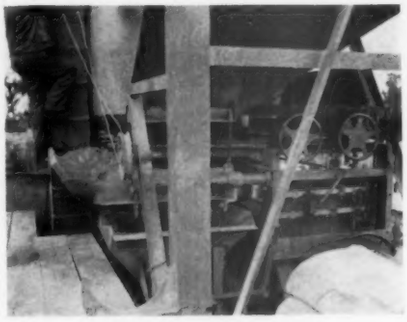
Another view of plant showing mixer, water tank, engine and aggregate feed hopper.

mixer batch and the hopper has a capacity of about 1½ batches. All of this equipment was supplied by the Equipment Corp. of America. At present 6-cu. ft. rubber-tired buggies are used for pouring columns and walls and most of the concrete will be handled in this manner. Concrete for some of the footings was chuted into place and some of the basement floor will be poured in this way.

On this job a 1:2.17:4.2 mix by volume is specified with 6.5 gal. of water per sack of cement and a slump of not over 5 in. Tests made by the Pittsburgh Testing Laboratory show that the strength of the concrete produced by this plant averages over 3,000 lb. per sq. in. in 7 days. A 1½-min. mix is specified and this is insured by an automatic timer on the mixer. Batches are being turned out in from 2 min. to 2 min. 9 sec. each. Using a designed mix, 21.3 cu. ft. of concrete are being obtained on a 4-bag batch.

No attempt has been made and there has been no need to push the plant to capacity but it has been turning out 135 cu. yd. in 7½ hr. with ease. This has been done with three men on the plant, one handling cement, one helping dump the truck and the other operating the mixer and batcher. According to Fred J. Lundstrom, superintendent for the contractor, this plant could turn out 170 to 180 cu. yd. in 8 hr. using a leaner mix and an additional man handling cement. Shorter mixing time would also increase its capacity. Where ideal conditions prevail and maximum capacity is not required he says this would be a 2-man plant.

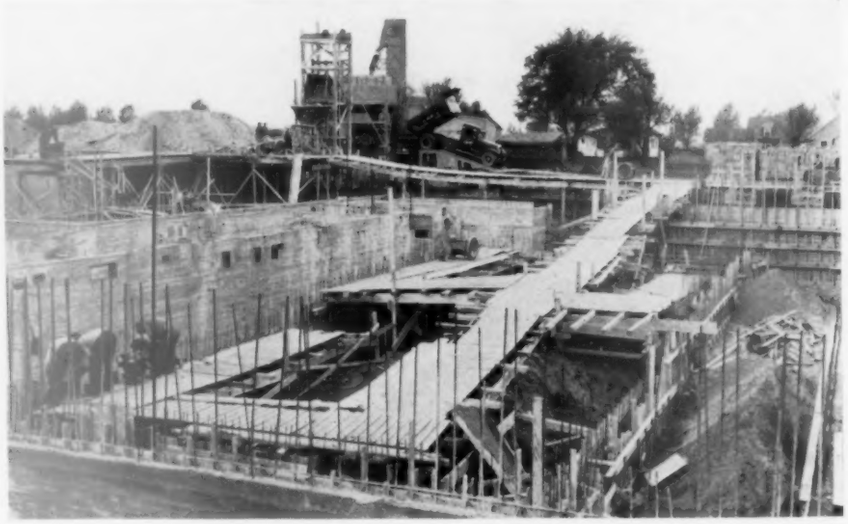
Mr. Lundstrom is enthusiastic about this plant and its possibilities. He believes it can be used to advantage on any kind of construction including buildings, highways, bridges, etc., on which the daily pour required does not exceed the plant's capacity. Mr. Lundstrom also sees a large field for this plant in the ready-mixed concrete industry to supplement existing stationary plants or for aggregates producers to rent out to contractors in their territories.



A view of operator's platform showing batcher, bin gates, scales, etc.

Mr. Lundstrom says the plant was set up in 1½ hr. on its present site where the ground is somewhat soft, but that this could be done in about an hour on a pavement or other firm footing. The plant is stabilized by means of wooden blocks and shims, but on a firm footing he says four jacks would be used under the frame, saving considerable time in setting up.

According to Mr. Lundstrom the plant, when folded up for moving to another location, meets all state laws on length, width and height. It is 8 ft. wide and 12 ft. 10 in. high over-all. Illinois law limits speed to 12 m.p.h. on the highways. He expects to tow the plant with a truck for any moves up to 40 or 50 miles For longer hauls the plant would be mounted on a trailer or on a railway car. The plant weighs 12 tons and is mounted on four wheels in front and four in back. Goodrich 7:50 by 15-in. 10-ply tires are used. The rear wheels are equipped with brakes.

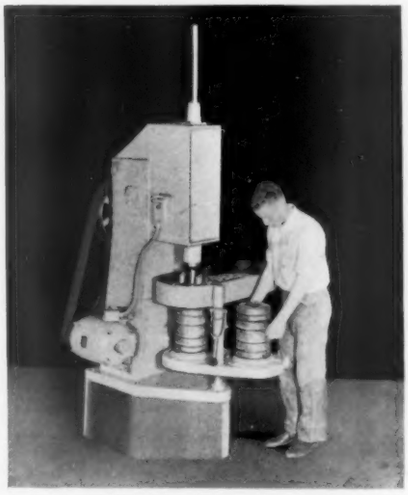


Pouring of basement walls and columns in progress on the West Senior High School at Rockford, Ill. Plant is in background.

• Drain-Tile Machine

A new low-priced drain-tile machine has been recently announced by the W. E. Dunn Mfg. Co. of Holland, Mich.

The machine is particularly designed for the smaller markets where a large investment in equipment is probably not justified. It produces all sizes up to 8 in. at an average production speed of 4 per min. May be operated by one or two men, turning out 1,000 to 2,000 tile per day. It requires a floor space of only 2½ by 3½ ft. and can be operated from a lineshaft or by a 3-hp. electric motor mounted on the machine itself. The material is fed from a reciprocating feeding table equipped with a positive lock.

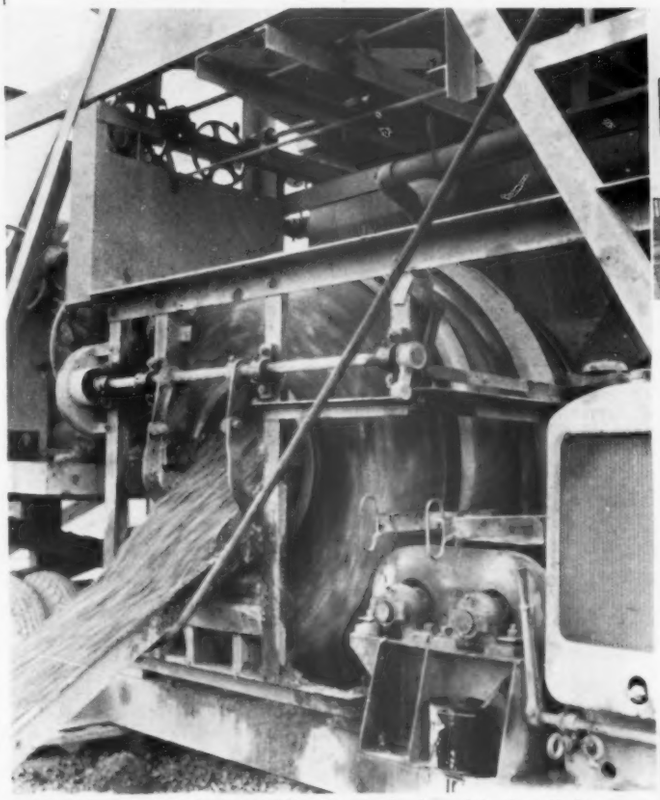


The concrete drain-tile machine.

All bearings are replaceable, bronze-bushed and equipped with Alemite fittings. Cut-gear drive runs in oil, completely encased in housing.

The Cummins Diesel Sales Corp. of Illinois, with offices at 1935 S. Indiana Ave., Chicago, announces the appointment of Leonard W. Beck as manager, effective May 1. Appointment of Mr. Beck completes the reorganization of the Illinois territory which the Cummins Engine Co., of Columbus, Ind., will in the future operate as a factory branch, succeeding the Cummins Diesel Sales & Service Co. of Illinois.

STRAYER PORTABLE CONCRETE PLANT



View shows power plant and different controls also quick mixer discharge

Plant in transit

Move a Strayer Portable onto the job and be ready to mix concrete in an hour or two. Others are doing this very thing. It's a complete portable storage, self-loading, batching and mixing plant, which is towed by truck from job to job. It's fully equipped to produce low cost concrete under any specifications.

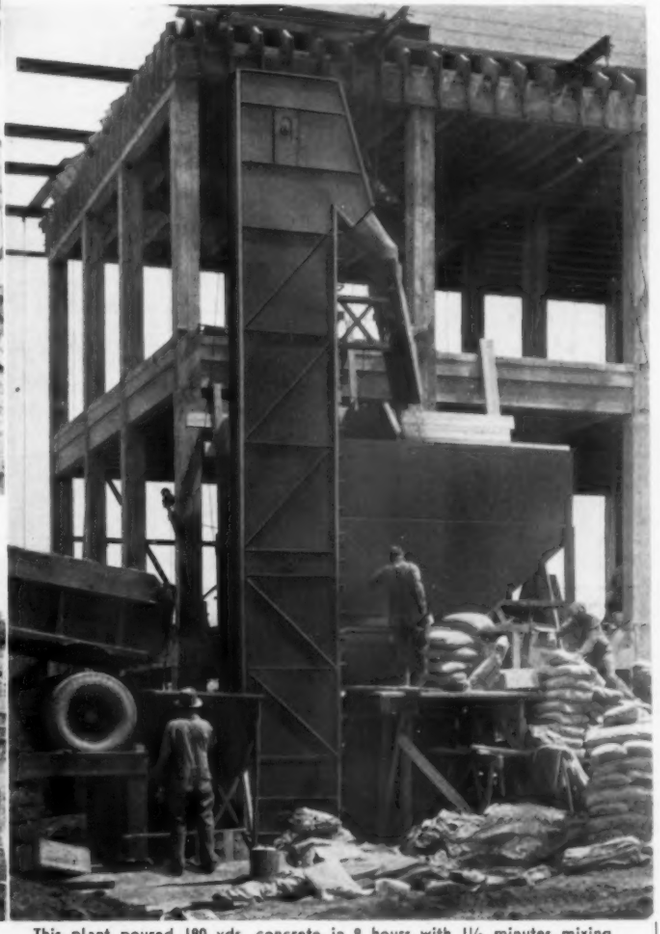
No rehandling of materials, it loads bin compartments and batches material by weight. No costly set-ups and take-downs. Exclusive of cement handling, one man operation.

Capacity up to 32 yds. per hour depending on conditions and mixing time.

Bins made 2 or 3 compartment as ordered. Users find application on large and small size jobs, some of which we have never thought of.

Strayer Portable Plant serving concrete elevator

High School project, Rockford, Ill., using Strayer Concrete Mixing Plant

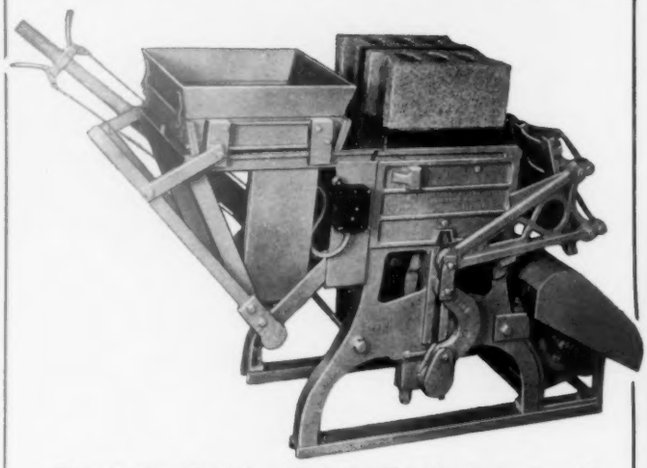


This plant poured 180 yds. concrete in 8 hours with 1½ minutes mixing time, Administration Bldg., U. S. Veterans Hospital, North Chicago, Ill.

ERIE STEEL CONSTRUCTION COMPANY

Box 1031-P, Erie, Pennsylvania

This Time Tested Unit Now Available *with Vibration*

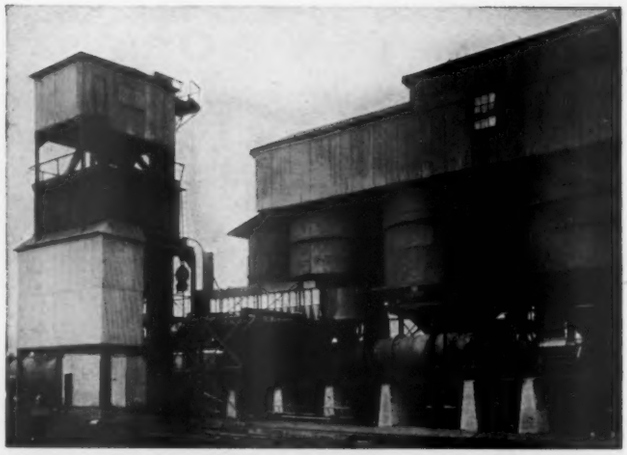


This is the Multiplex Model C Double Stripper with the new variable speed vibrator attached. Vibrates while filling, and pressure is applied to finish top of block.

Makes plain and face block in all sizes from 3" to 12" in width, with press-top finish.

Investigate this new unit.

THE MULTIPLEX CONCRETE MACHINERY COMPANY
ELMORE OHIO



WARREN ASPHALT PLANTS
HOT MIX —— COLD MIX
—— OR ——
COMBINATION UNIT FOR BOTH TYPES
CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
—— By ——
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

Heltzel
BUILDS IT BETTER
HELTZEL MODERN STEEL BIN AND ELEVATOR EQUIPMENT FOR THE LIME PRODUCTS INDUSTRY.
HELTZEL STEEL FORM & IRON CO. WARREN, OHIO, U.S.A.

NEW *Sewer and Culvert Construction*
By making concrete pipe on the job with Quinn Forms you give more men more work, can use less experienced labor and produce uniform concrete pipe of highest quality. Recognized standard of all concrete pipe.

QUINN PIPE FORMS
Quinn Heavy Duty and Medium Duty Pipe Forms best for hand or wet process pipe. Give more years of service. All diameters—12 to 84 inches. Tongue and groove or bell end pipe, any length.
WRITE for New Book on Concrete Pipe giving information and prices, valuable tables on production costs, strength tests, Pipe Forms, Pipe Machines, etc. Book sent free.
QUINN WIRE & IRON WORKS 1627 12 St. Boone, Iowa

START A NEW BUSINESS

This shows one of our Multiple Molds for casting 8x8x16" concrete blocks. We manufacture a complete line of Multiple Molds for blocks (both Rockface and plain), for brick, veneer blocks, etc. We are also owner and originator of the ZAGELMEYER SYSTEM of granite veneer for blocks.

Make
ZAGELMEYER
Waterproof Concrete Blocks
A Start May Be Made With as Little as $500.00

The Zagelmeyer System produces a block that no other system can equal. Many good territories open. Write today for further information.

Zagelmeyer Cast Stone Block Machinery Co.
502 S. Henry St. BAY CITY, MICH.

Lewistown Foundry Products
ARE
Performance-Tested
BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS
Lewistown Foundry & Machine Co.
Lewistown, Pa.

CUMMER ASPHALT PLANTS

COMBINATION HOT AND COLD MIX PLANTS

Using the Combination Two Fire Dryer Cooler.

HOT MIX PLANTS

Using the new Cummer Internal Fire Dryer.

DRYERS

Combination Two Fire Dryer Cooler
The New Cummer Internal First Dryer
(1 machine)

STEAM JACKETED ASPHALT BUCKETS

Stationary, bottom discharge type.

VIBRATING SCREENS

Cummer-Robins inclined type for any make or size of asphalt plant.

MIXERS

400 to 5000 pound batch, steam jacketed, with the new mixer teeth adjustable for top or binder without change.

Write for bulletins.

THE F. D. CUMMER & SON CO.
Cleveland Ohio
Builders of fine asphalt paving machinery since 1895

COMMERCIAL PALLETS

Are the proper equipment for the economical production of concrete blocks.

Their light weight permits lightened labor for off bearers, and the deep embossed ribs give strength and rigidity, and made of high grade, heavy gauge steel, superior to other types of pallets. Prevents loss of pallets by breaking, cracking or bending.

Air can circulate freely through the cores, hastening curing, rack cars can be loaded to capacity, without adding excess pallet weight.

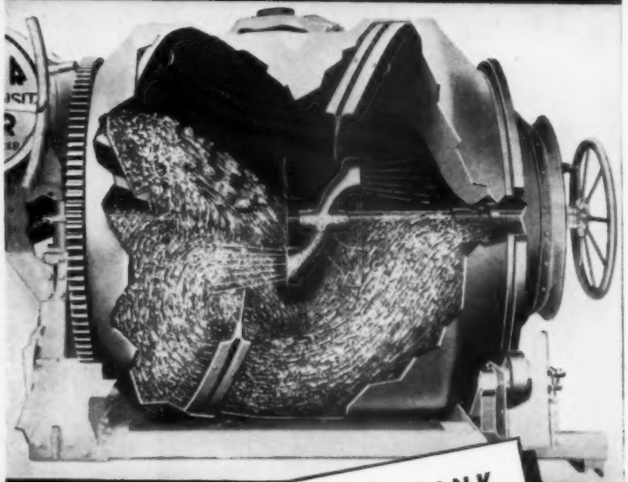
Made to fit core boxes of the new vibrators and all the older types, Ideal, Anchor and Stearns machines.

Write for Catalog
or
Ask Your Machinery Maker

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

They're Buying Jaegers because

JAEGER ALONE Builds This MODERN TRUCK MIXER....



SYPHO-METER WATER TANK 1.

Accurate within a fractional per cent of tank capacity **regardless of tank position or splashing on roughest roads**—a 1939 improvement.

DUAL REVOLVING WATER SPRAYS 2.

100% faster, uniform water distribution—clear path as they revolve, spray ***into and over mass in both directions, from end to end of drum*** —insure thoro mix even on shortest hauls—a 1939 improvement.

MORE SALABLE CONCRETE 3.

Jaeger Reversing End-to-End Mix, plus accurate measurement and more rapid and uniform distribution of water, produce recognized higher strength concrete, give Jaeger operators a basic sales advantage. Bulletin TM-39 gives up-to-the-minute information. Send for your copy.

THE JAEGER MACHINE COMPANY
602 Dublin Ave. Columbus, Ohio

SMITH-MOBILE

THE *Modern* TRUCK MIXER and AGITATOR

HIGH DISCHARGE — Now you can pour concrete directly into high forms without having to use wheelbarrows or carts. The SMITH-MOBILE discharge height is from *24" to 34" higher* than other truck mixers. This important feature gives you a much larger spreading and delivering area—saves the cost of a rear end hoist—eliminates the work of building a ramp—speeds up concrete delivery at the job.

ONLY A SMITH-MOBILE Truck Mixer is equipped with these exclusive, time-saving features: Fast feed chute charging—Mixes while charging — Visible mixing — High discharge — Controlled discharge—Water introduced through feed opening. Be sure to get the complete Smith-Mobile story. Ask for bulletin.

THE T. L. SMITH COMPANY
2887 N. 32nd Street MILWAUKEE, WIS.

YEARS AHEAD IN TRUCK MIXER DESIGN

BIG OPPORTUNITIES

MANUFACTURING MATERIALS FOR LOW COST BUILDING

OPPORTUNITY COMPLETE, READY-MADE FOR YOU IN YOUR LOCALITY—One that is proven—ready for you to cash in on the great building upturn under way. It includes the essentials upon which sound and successful business enterprises are established.

SUPERIOR PRODUCT, LOW COST PRODUCTION—You will produce a material nearly 20% lighter in weight—A product capable of meeting all known building requirements—One accepted by Government and City Building Departments—Requiring 20% less material—Made by line production machines.

EARNING POWER AND FUTURE—Present DUNBRIK-DUNSTONE Manufacturers already point the way for you. Some are selling output at 100% over cost. Others are getting as high as 80% of the brick business.

WE EQUIP YOU WITH LINE PRODUCTION MACHINERY—Large Production—only one or two men. Equipment costs but fraction of other processes of equal capacity. Franchise granted covering your locality—protecting your market, business and future.

INVESTIGATE NOW—Send for "4 Keys to Success." It tells the complete story—How present manufacturers are making outstanding progress in this new industry—One that offers unlimited opportunity for growth, expansion and profit. Write today.

BETTER MATERIAL AT LOWER COST

Countless numbers of new homes, apartments and structures for business and industrial purposes are needed today. Government, industry, business, financial institutions and municipalities—all are combining to speed up this needed construction. They actually are paving the way and assuring a market for the man equipped to supply the enormous demand in his territory for building materials.

Your product will be permanent, fire and termite proof—in a full range of beautiful colors, shades and textures. Improved design cuts construction costs to the level of frame—and with factory-to-job delivery, offers new standard of service to building trade in your community.

W. E. DUNN MFG. CO. 420 W. 24TH ST., HOLLAND, MICHIGAN

112 YEARS

It's a Long Time to Specialize

• • •

The McCarter family practically "grew up in asphalt." Three generations have been identified with the asphalt paving business since its inception. About 1870 Samuel McCarter invented and patented the Walker Press for making both asphalt paving blocks and tiles. In 1886 he invented and patented the oscillating press for the manufacturing of blocks. Subsequent patents for improved presses were granted to the original patentee's son, now president of the company.

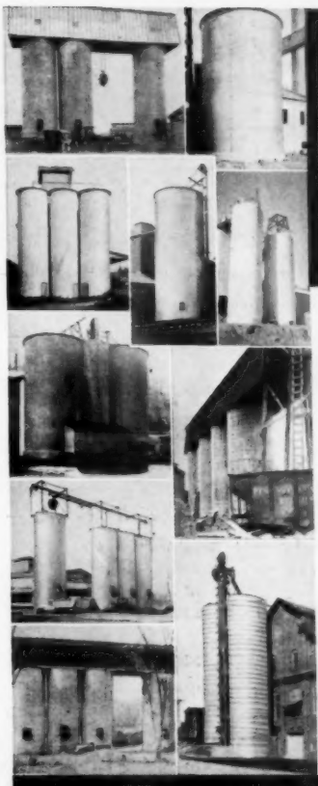
McCarter mixing plants have been developed to a high degree of efficiency, following the family tradition of always setting the pace in improvements and methods. Plants complete in every detail are designed to suit your individual needs, fabricated in our shops, and erected as your plot condition requires. We can repair or modernize your present plant to conform with the best standards of the industry.

"McCARTER" ON AN ASPHALT MIXING PLANT IS YOUR ASSURANCE OF "PEDIGREED PERFORMANCE."

Write for Bulletin

Designers and Manufacturers uninterruptedly since 1827

The McCarter Iron Works, Inc.
NORRISTOWN PENNSYLVANIA



INDUSTRY "Goes MORE MODERN" With Marietta Enduring Concrete STORAGE SYSTEMS

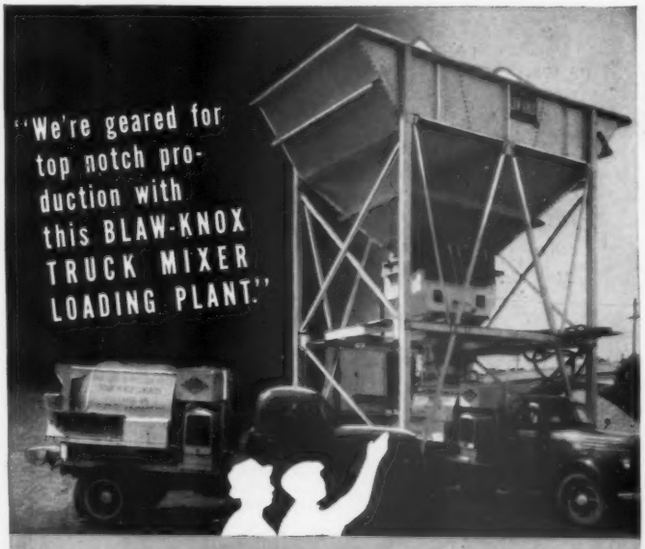
Wasteful, fire-hazardous, short-lived wood storage bins are disappearing—as industry "goes more modern" with Marietta Concrete installations. . . . Step up plant efficiency—fill quicker, unload by gravity, stop waste of labor, materials and profits with "Marietta." *Built to Endure!* .... For dry processed materials, a special insulation used — to protect against moisture condensation.

Especially: Cement mills; aggregate, process lime, silica sand and gypsum producers—also plants using power coal—find Marietta Concrete Storage Systems economical to install and operate—earning profits many years after "charged off" . . . Let our Engineers present "Profit Facts." Write *Today*.

MARIETTA CONCRETE CORPORATION
MARIETTA, OHIO
(*Baltimore, Md.*)

BUILD TO ENDURE

MARIETTA CONCRETE STORAGE SYSTEMS



Blaw-Knox is the only manufacturer offering complete equipment for ready mixed concrete; including Trukmixers and Agitators, Ready Mixed Concrete Plants and Truck Mixer Loading Plants of all capacities and types.

Send for Blaw-Knox Catalogs Nos. 1566 and 1582.

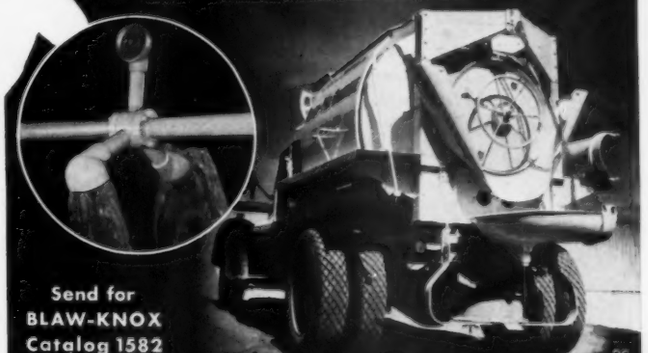
BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX *Truck Mixer* **LOADING PLANTS**

FAST WATER!

"MAN . . . That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."

The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.



Send for BLAW-KNOX Catalog 1582

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and **TRUKMIXERS**

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

Index to Advertisers on Page 96

Abrasives
Carborundum Co., The

Aggregate-Bituminizing Plants
Cummer & Son Co., The F. D.
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Aggremeters
*Erie Steel Construction Co.

Agitators, Thickeners and Slurry Mixers
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Air Compressors (Stationary)
Fuller Company

Air Filters
*Blaw-Knox Co.
*Buell Engineering Co.
*Parsons Engineering Corp.

Air Separators
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
Alloy Steel & Metals Co.
Chicago Steel Fdry. Co.
Manganese Steel Forge Co.

Arresters (Lightning)
*General Electric Co.

Ash and Refuse Handling Equipment
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Cummer & Son Co., The F. D.
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Automatic Feeders
*Fuller Company
*Jeffrey Mfg. Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Merrick Scale Mfg. Co.

Automatic Weighers
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Fuller Company
*Jaeger Machine Co.
McCarter Iron Works, Inc., The
*Merrick Scale Mfg. Co.

Backfillers
*Bucyrus-Erie Co.

Balls (Grinding)
*Jeffrey Mfg. Co.
Manganese Steel Forge Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Jeffrey Mfg. Co.
Manganese Steel Forge Co.
*Smidth & Co., F. L.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Bases (Trolley)
*General Electric Co.

Battery Charging Equipment
*General Electric Co.

Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
Robins Conveying Belt Co.
Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing
Flexible Steel Lacing Co.

Belting
*Cincinnati Rubber Mfg. Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Belting (Conveyor and Elevator)
Goodyear Tire & Rubber Co.

Belts (Fan)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Belts (Multiple-V)
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Bin Gates
*Erie Steel Construction Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bins (Concrete)
Marietta Concrete Corp.

Bins (Steel)
*Blaw-Knox Co.
*Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
National Powder Co.

Blasting Supplies
*Ensign-Bickford Co.
National Powder Co.

Block Machines (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Block Machines (Power Press, Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Blocks (Sheave)
*Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
Sprout, Waldron & Co.

Blowers
Buell Engineering Co.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Jaeger Machine Co.
*Smith Co., T. L.

Bodies (Dump Truck)
Commercial Shearing & Stamping Co.

Boots (Rubber)
Goodyear Tire & Rubber Co.

Borings (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Breakers (Circuit)
*General Electric Co.

Brick (Fire)
Carborundum Co., The

Brick (Refractory)
Carborundum Co., The

Brick Machines (Concrete)
Dunn Mfg. Co., W. E.

Brick Manufacturing Equipment
Dunn Mfg. Co., W. E.

Bronze Work (Ornamental)
*National Wire Cloth Co.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Asphalt)
McCarter Iron Works, Inc., The

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
*Link-Belt Co.
Owen Bucket Co.
Wellman Engineering Co.

Buckets (Dragline—Cableway)
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Wellman Engineering Co.

Buckets (Dump)
*Brooks Equip. & Mfg. Co.
*Dempster Bros. Inc.
*Jaeger Machine Co.

Buckets (Elec. Heated, Weighing)
McCarter Iron Works, Inc., The

Buckets (Elevator and Conveyor)
Chicago Steel Fdry. Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Buggies (Dump)
*Koehring Co.

Bulk-Cement Storage Plants
Heltzel Steel Form & Iron Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.

Burners (Oil)
Best Engineering Co., W. N.

Cable (Electric)
*General Electric Co.

Cableways
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
*Roebling's Sons Co., John A.
*Sauerman Bros., Inc.

Capacitors
*General Electric Co.

Caps (Blasting)
National Powder Co.

Caps (Blasting, Electric)
National Powder Co.

Capstans (See Winches and Capstans)

Car Control Systems
*General Electric Co.

Car Dumpers
*Link-Belt Co.
Wellman Engineering Co.

Car Pullers
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Car Wheels — (See Wheels — Car)

Carriers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Carryalls
*Koehring Co.

Cars (Block, Concrete)
*Link Belt Co.
*Multiplex Concrete Machinery Co.

Castings
Alloy Steel & Metals Co.
Chicago Steel Fdry. Co.
*Eagle Iron Works
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan & Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
*Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

Chutes and Chute Liners
Goodyear Tire & Rubber Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Circuit Breakers and Testers
*General Electric Co.

Classifiers
*Deister Machine Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Straub Mfg. Co.

Clips (Wire Rope)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
*Roebling's Sons Co., John A.

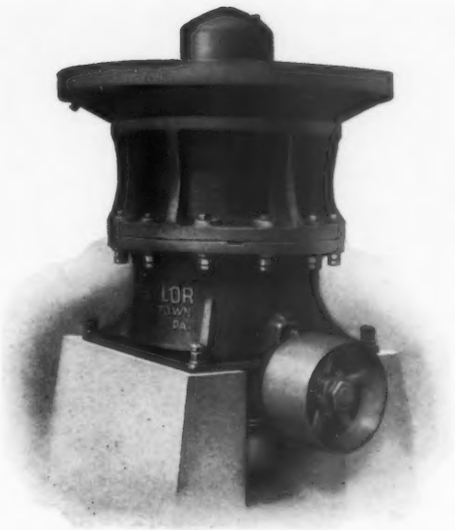
Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Jeffrey Mfg. Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Smidth & Co., F. L.
Strong-Scott Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

*See also information in the 1939 Pit and Quarry HANDBOOK.



FOR SALE—
LARGE CAPACITY of SMALL PRODUCT
PRICE INTERESTING!

A Packard cannot be purchased at the price of a Ford, but it has been proved many times that operators can secure the largest capacity of satisfactory small product at a very reasonable capital investment by use of a

TRAYLOR
TY REDUCTION CRUSHER

Our Bulletin 2112 tells all about the TY. Send for it and at the same time ask for Bulletin 1105 which illustrates and describes the most modern and efficient Blake Type Crusher today available.

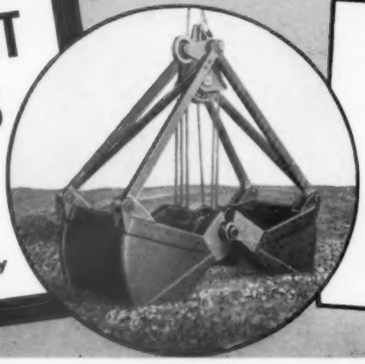
TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA . U.S.A.

NEW YORK CITY 3916 Empire State Bldg. CHICAGO 815 One La Salle St. Bldg. SALT LAKE CITY 101 West Second South St. LOS ANGELES 919 Chester Williams Bldg. SEATTLE 6311 22nd Ave., N. E.
THE CANADIAN FAIRBANKS-MORSE CO., LTD. 980 St. Antoine St., Montreal, P. Q., Canada
B. C. EQUIPMENT CO., LTD. Vancouver, B. C., Canada
MAQUINARIA INTERNACIONAL, S. R. L. Av. Francisco I. Madero No. 17 Desp. 214, Mexico, D. F., Mexico
MANILA MACH. & SUPPLY CO., INC. Manila and Baguio, P. I.
Export Department—104 Pearl St., New York City.
Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

---

INDUSTRIAL BROWNHOIST BUCKETS
ROPE-REEVE
POWER-WHEEL
LEVER-ARM
LINK-TYPE
½ to 15 Yards Capacity

for Bigger Output at Lower Costs

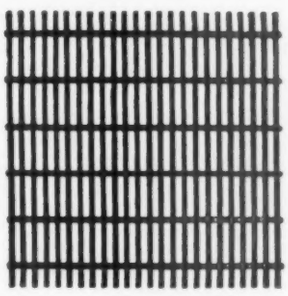


The value of our forty years experience in building better buckets is best demonstrated by the enthusiastic comments of their owners. Here is one recently received. "We are handling more coal with our new Industrial Brownhoist 1¼-yard Clamshell than we ever did with our old 2-yard bucket."

Because the new Industrial Brownhoist buckets are designed to meet today's materials handling problems, increased production and profits invariably result wherever they are used.

Get the complete facts from Booklet 353. Send for a copy.

INDUSTRIAL BROWNHOIST CORP., BAY CITY, MICHIGAN
District Offices:
New York · Philadelphia · Pittsburgh · Cleveland · Chicago



Rolled Slot

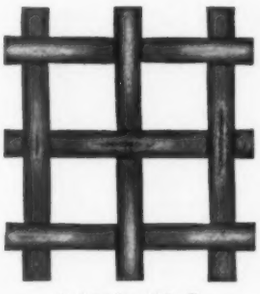
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

COST-CUTTING ITEMS FOR CEMENT MILLS

Durable Clinker Buckets

for handling molten clinker to stock-pile *last longer* and *cost less per year* when made either of PYRASTEEL or of EVANSTEEL with heat treated cams.

Other economy items are:—

Drag Chains of PYRASTEEL
Screw Conveyors of EVANSTEEL
Cooler Plates of PYRASTEEL
Feed Pipes of PYRASTEEL

Write for Bulletin

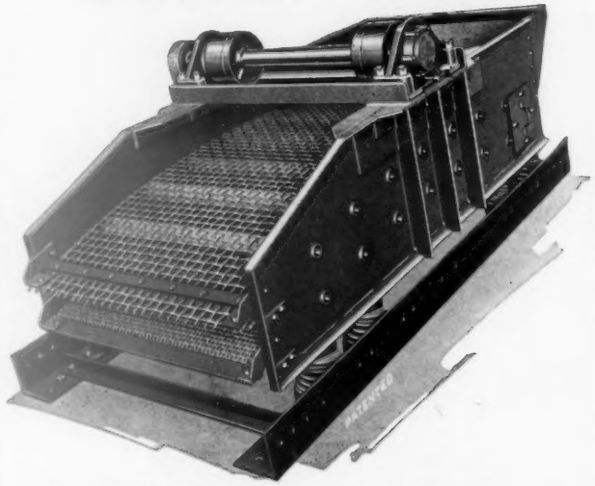
CHICAGO STEEL FOUNDRY COMPANY

37th Street at Kedzie Ave., Chicago

Makers of Alloy Steel for 30 Years

PYRASTEEL for high temperatures — EVANSTEEL for strength

DEISTER PLAT-O VIBRATING SCREEN



1. Simple powerful vibrating mechanism.
2. Screen cloth automatically held under uniform tension.
3. Any one screening surface changed without disturbing remaining decks.
4. Cushioned vibration.

DEISTER MACHINE CO.

1933 E. WAYNE ST. FT. WAYNE, IND.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 96

Concrete Mixers
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Jaeger Machine Co.
*Koehring Co.
*Smith Co., T. L.

Concrete Products Plant Equipment
*Universal Concrete Pipe Co.

Concrete Slab Raising Equipment (Mud Jacks)
*Koehring Co.

Cones (Sand-Washing)
*Link-Belt Co.
Smith Engr. Works

Controllers (Electric)
*General Electric Co.

Converters (Electric)
*General Electric Co.

Conveyor Belting
Goodyear Tire & Rubber Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Conveyor Idlers and Rolls
*Barber-Greene Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Bacon, Inc., Earle C.
*Barber-Greene Co.
Chicago Steel Fdry. Co.
*Fuller Company
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
Straub Mfg. Co.

Conveyors (Pneumatic)
*Fuller Company

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Coolers (Clinker)
*Fuller Co.
Link-Belt Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Industrial Brownhoist Corp.
*Koehring Co.
*Link-Belt Co.

Cranes (Electric Traveling)
*Erie Steel Construction Co.
Industrial Brownhoist Corp.

Cranes (Overhead)
*Erie Steel Construction Co.
Industrial Brownhoist Corp.

Crusher Parts
Alloy Steel & Metals Co.
*American Pulverizer Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
Rogers Iron Works
*Traylor Engr. & Mfg. Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Jeffrey Mfg. Co.
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
Alloy Steel & Metals Co.
Bacon, Inc., Earle C.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
Rogers Iron Works
Smith Engr. Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Rogers Iron Works
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*American Pulverizer Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
Alloy Steel & Metals Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Rogers Iron Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutter Heads (Dredging)
*Eagle Iron Works

Detonators
National Powder Co.

Diesel Engines (See Engines—Diesel)

*See also information in the 1939 Pit and Quarry HANDBOOK.

Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
*Koehring Co.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
Industrial Brownhoist Corp.
*Koehring Co.
*Link-Belt Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Driers
Cummer & Son Co., The F. D.
Lewistown Fdry. & Machine
*Link-Belt Co.
McCarter Iron Works, Inc., The
McLanahan & Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bit Sharpeners
Alloy Steel & Metals Co.

Drill Bits
*Bucyrus-Erie Co.

Drill Sharpening Machinery
*Bucyrus-Erie Co.

Drilling Accessories
*Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Rock)
*Jeffrey Mfg. Co.

Drills (Wagon)
*Bucyrus-Erie Co.

Drills (Water Well)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
*Link-Belt Co.

Dust Arresters
*Blaw-Knox Co.
*Buell Engineering Co.
*Parsons Engineering Corp.

Dust Collecting Systems
*Blaw-Knox Co.
*Buell Engineering Co.
McCarter Iron Works, Inc., The
*Parsons Engineering Corp.
*Raymond Pulverizer Division of the Combustion Engineering Co.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
*Blaw-Knox Co.
*Buell Engineering Co.
*Fuller Company
*Parsons Engineering Corp.

Dust Filters
*Buell Engineering Co.
*Parsons Engineering Corp.

Dynamite (See Explosives)

Dynamos
*General Electric Co.

Electric Cables (See Cables—Electric)

Electrical Equipment
*General Electric Co.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator and Conveyor)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
Bacon, Inc., Earle C.
*Fuller Company
Hetherington & Berner, Inc
McLanahan and Stone Corp
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.
Strong-Scott Mfg. Co.
*Traylor Engr. & Mfg. Co
Wellman Engineering Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
*Nordberg Mfg. Co.

Engines (Internal-Combustion)
*Nordberg Mfg. Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
National Powder Co.

Fans
*General Electric Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.

Feeders
*Fuller Company
*Jeffrey Mfg. Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*McLanahan and Stone Corp.
*Merrick Scale Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Furnaces (Heat Treating Electric)
*General Electric Co.

Fuse Cutouts
*General Electric Co.

Fuses (Detonating)
*Ensign-Bickford Co.
National Powder Co.

Fuses (Electrical)
*General Electric Co.

Gas Producers
Wellman Engineering Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gear Motors
*General Electric Co.

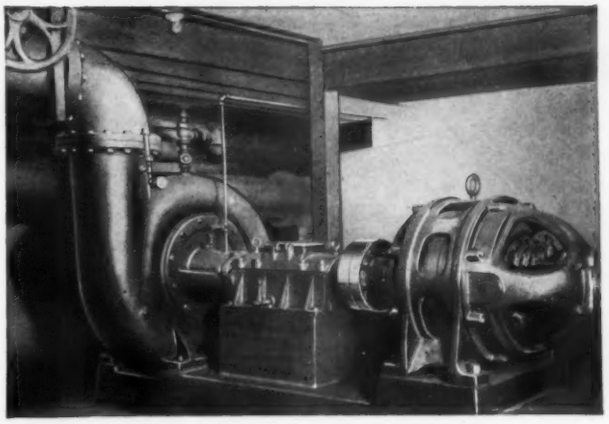
Gears (Herringbone)
*General Electric Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Gears and Pinions
*General Electric Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

* See also information in the 1939 Pit and Quarry HANDBOOK.

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



Should an Old Pump Be Repaired or Replaced? . . .

If your 10 or 15-year old pump shows need of repairs, do not order a new part before investigating how much a new Morris Pump will cost and how much it will save. In many instances a new Morris Pump costs little more and may even cost less than repairing an old pump, and in practically every case the improvement in efficiency—usually 10% or more—quickly repays the entire cost of the new pump. You will find the estimates and recommendations of the Morris Engineers conservative as well as authoritative, and their advice is offered without obligation.

Dredges that reduce the cost of sand and gravel production . . .

The long list of Morris Dredge installation records is full of examples of speedy, economical and trouble-free sand and gravel production.

In one case a Morris Dredge delivers a barge full of material in half the expected time. In another case a Morris Dredge doubled the capacity and dredging depth formerly obtained. In a third case a Morris Dredge handled more than a million cubic yards of heavy material without requiring renewal of any of the Morris Pump parts. In many additional cases, Morris Dredges have enabled purchasers and contractors to meet severe conditions without difficulty and to reduce operating and maintenance costs.

Bulletins on Morris Dredge designs sent on request.

MEMBER

For authoritative recommendations on any pumping or dredging problem, write Morris Machine Works, Baldwinsville, N. Y. Export Office: 30 Church St., New York, N. Y.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 96

Gelatin (See Explosives)

Generator Sets (Engine)
*General Electric Co.

Generator Sets (Motor)
*General Electric Co.

Generator Sets (Turbine)
*General Electric Co.

Generators (See Motors and Generators)

Generators (Electric)
*General Electric Co.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
*Erie Steel Construction Co.
Owen Bucket Co.

Grating (Steel)
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Eagle Iron Works
*Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Manganese Steel Forge Co.
*National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Haulage Systems (Electric)
*General Electric Co.

Heaters (Bitumen)
McCarter Iron Works, Inc., The

Hoists
Commercial Shearing & Stamping Co.
Hetherington & Berner, Inc.
Industrial Brownhoist Corp.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The

Hose (Air, Steam and Water)
*Cincinnati Rubber Mfg. Co.
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hose (Petroleum)
Gates Rubber Co.

Hose (Radiator-Engine Cooling)
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hose Couplings (See Couplings)

Hydrate Plants (Comp.)

Hydraulic Guns (See Guns—Hydraulic)

Idlers
*Barber-Greene Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

Instruments (Electrical)
*General Electric Co.

Insulation (Electric)
*General Electric Co.

Kiln Linings (Refractory)
Carborundum Co., The

Kilns and Coolers (Rotary)
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kominuters
*Smidth & Co., F. L.

Ladders (Agitating Dredge)
*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

Lighting
*General Electric Co.

Lights (Flood)
*General Electric Co.

Lime-Handling Equipment
*Fuller Company
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Robins Conveying Belt Co.
*Traylor Engr. & Mfg. Co.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Linings (Kiln, Refractory)
Carborundum Co., The

Loaders and Unloaders
*Barber-Greene Co.
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Diesel-Elec.)
*General Electric Co.

Locomotives (Elec., Gas & Steam)
*General Electric Co.

Locomotives (Gas-Electric)
*General Electric Co.

Locomotives (Oil-Electric)
*General Electric Co.

Locomotives (Storage Battery)
*General Electric Co.

Locomotives (Trolley Battery)
*General Electric Co.
*Jeffrey Mfg. Co.

Machinery Wearing Parts
Alloy Steel & Metals Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Magnets
*General Electric Co.

Manganese Steel
Alloy Steel & Metals Co.
Manganese Steel Forge Co.

Manganese Steel Castings
Alloy Steel & Metals Co.

Manganese Steel (Plates and Sheets)
Alloy Steel & Metals Co.
Manganese Steel Forge Co.

Measuring Devices (Electric)
*General Electric Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Meters
*General Electric Co.

Mill Liners and Linings
Alloy Steel & Metals Co.
*Jeffrey Mfg. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
Rogers Iron Works
*Smidth & Co., F. L.
Sprout, Waldron & Co.
Straub Mfg. Co.
Strong-Scott Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Mills (Pug)
McCarter Iron Works, Inc., The

Minerals Separation (Cement)
(See Cement Minerals Separation)

Mixers (Asphalt)
Cummer & Son Co., The F. D.
Hetherington & Berner, Inc.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Warren Bros. Roads Co.

Mixers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Link-Belt Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Motor Control
*General Electric Co.

Motor Trucks
Marmon-Herrington Co.

Motors (Electric)
*General Electric Co.

Motors & Generators
*General Electric Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Moulds and Forms (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.
*Link-Belt Co.

Oil Burners
Best Engineering Co., W. N.

Outdoor Lighting Equipment
*General Electric Co.

Packings
*Cincinnati Rubber Mfg. Co.
Republic Rubber Co.

Pallets
Anchor Concrete Machy. Co.
Commercial Shearing & Stamping Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Partitions (Wire)
*National Wire Cloth Co.

Paving Mixers
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
Chicago Perforating Co.
*Hendrick Mfg. Co.
Rogers Iron Works
*Sprout, Waldron & Co.

Pipe, Dredge (Floating and Shore)
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
Quinn Wire & Iron Works
*Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Quinn Wire & Iron Works
*Universal Concrete Pipe Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe (Welded)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plants (Aggremeter)
*Erie Steel Construction Co.

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
*Barber-Greene Co.
*Fuller Company
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
*Barber-Greene Co.
Brooks Equip. & Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Powder, (Black, Blasting) (See Explosives)

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Tampers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

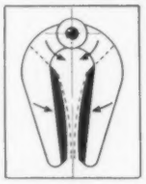
*See also information in the 1939 Pit and Quarry HANDBOOK.

KUE-KEN BALANCED CRUSHERS

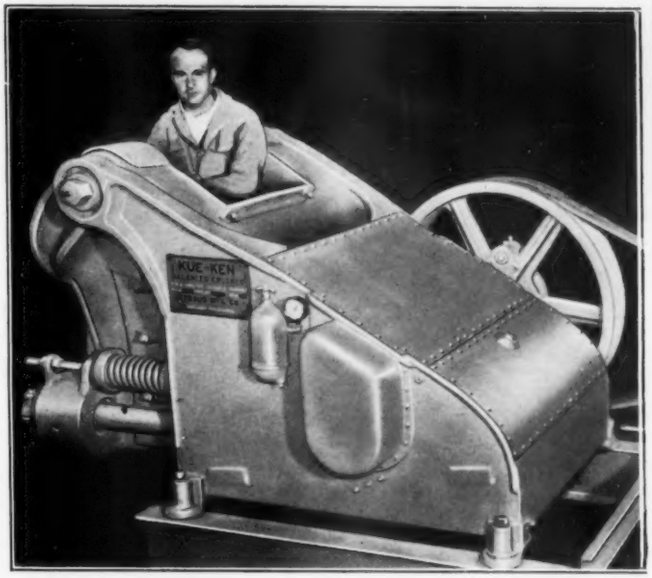
FEED FROM ANY ANGLE

Wide clear openings top and bottom permit feeding and discharging from any angle. The unobstructed receiving opening permits easy access or jaw plate replacement.

KUE-KEN crushers give lowest cost crushing. The new KUE-KEN principle of crushing without abrasion removes the greatest cause of wear. Jaw plates last much longer. There is no rubbing on the rocks between the jaws at the moment of crushing, or intense pressure. This is one of the secrets of the amazingly low power requirements. The arrows on the small cut below show the path of the jaw travel. Both move together in perfect balance downward with the rock stream. Rocks are helped on their way not hindered.



Bulletin 600 describes in detail several sizes of KUE-KEN crushers; also gives information on free crushing test service.



Size of receiving hopper on a No. 50 KUE-KEN is shown. Observe the clean, smooth streamlining of this all-steel crusher. Mechanism completely sealed in cool filtered oil bath. No outside oil pipes to get knocked off. "Tomorrow's crusher today."

STRAUB MFG. CO. 528 CHESTNUT STREET OAKLAND, CALIFORNIA

Right Down to Fighting Weight

You want more than dead weight in a bucket to lick a tough digging job. You want speed—agility! Williams design, welded construction, and special alloys insure stamina and ruggedness, without excessive weight. Williams Buckets carry plenty of weight, but they carry it in the right places and in the right proportions. You move more materials in less time with Williams Buckets—and that's profitable.

... and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

THE WELLMAN ENGINEERING CO.
7014 CENTRAL AVENUE • CLEVELAND, OHIO

Distributors located in all parts of the country represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

Send for Catalog

WILLIAMS *Buckets*
***built by* WELLMAN**
BUILT TO LAST . . . AND MOVE DIRT FAST!

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 96

Power Units (Internal Combustion)
*Nordberg Mfg. Co.

Pre-formed Wire Rope
*American Cable Division of the American Chain & Cable Co.

Press Machines (Hand, Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Proportioning Equipment
*Blaw-Knox Co.
*Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
*Merrick Scale Mfg. Co.

Pulleys
*Link-Belt Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
*Raymond Pulverizer Division of the Combustion Engineering Co.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Smidth & Co., F. L.
Straub Mfg. Co.
Strong-Scott Mfg. Co.
Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Fuller Company

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
*Morris Machine Works
*Smidth & Co., F. L.

Pumps (Centrifugal)
Hetherington & Berner, Inc.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Dewatering)
*Morris Machine Works

Pumps (Dredging)
Bucyrus-Erie Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Sand and Gravel)
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Turbine)
*Morris Machine Works

Pumps (Vacuum)
*Fuller Company

Pumps (Vertical)
*Morris Machine Works

Pumps (Well)
*Morris Machine Works

Racks (Curing)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Railways (Electric)
*General Electric Co.

Ready-Mixed Concrete Plants
*Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.

Recording Instruments & Meters
*General Electric Co.

Rectifiers
*General Electric Co.

Refractories
Carborundum Co., The

Regulators (Voltage)
*General Electric Co.

Relays
*General Electric Co.

Rheostats
*General Electric Co.

Rock Bit Grinders
Alloy Steel & Metals Co.

Rock Drills (See Drills—Rock)

Rod Mills
*Traylor Engr. & Mfg. Co.

Rods (Welding)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.

Rope (Wire) (See Wire Rope)

Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.

Sand Separators
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works

Sand-Settling Tanks
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

Scrapers (Power Drag)
*Link-Belt Co.
*Sauerman Bros., Inc.

Scrapers (Wagon)
*Bucyrus-Erie Co.

Scales
*Merrick Scale Mfg. Co.

Screens
Bacon, Inc., Earle C.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cummer & Son Co., The F. D.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Rogers Iron Works
*Roebling's Sons Co., John A.
Smith Engr. Works
Sprout, Waldron & Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Screens (Vibrating or Shaking)
*Barber-Greene Co.
Cummer & Son Co., The F. D.
*Deister Concentrator Co.
*Deister Machine Co.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Rogers Iron Works
Screen Equipment Co.
Smith Engr. Works
Sprout, Waldron & Co.
Straub Mfg. Co.
*Tyler Co., W. S.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Link-Belt Co.
*McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Eagle Iron Works
Gates Rubber Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Industrial Brownhoist Corp.
*Koehring Co.
*Link-Belt Co.

Silos
Marietta Concrete Corp.
McCarter Iron Works, Inc., The
*Smidth & Co., F. L.

Skip Hoists and Skips
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Robins Conveying Belt Co.

Sleeves (Dredge)
*Cincinnati Rubber Mfg. Co.

Speed Reduction Units
*General Electric Co.
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.
Straub Mfg. Co.

Stackers
*Jeffrey Mfg. Co.

Starters (Automatic Motor)
*General Electric Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (High Tensile)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
Manganese Steel Forge Co.

Steel (Open Hearth)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
Manganese Steel Forge Co.

Steel Grating (See Grating, Steel)

Steel Plate Construction
Gilmore Wire Rope Division of the Jones & Laughlin Steel Co.
Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
*Erie Steel Construction Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Marietta Concrete Corp.
*Sauerman Bros., Inc.

Switchboards (Electric)
*General Electric Co.

Switches (Electric)
*General Electric Co.

Switches (Safety)
*General Electric Co.

Tamp Machines (Hand, Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
Zagelmeyer Cast Stone Block Machy. Co.

Tanks
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Traylor Engr. & Mfg. Co.

Tanks (Sand-Settling)
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Tire Repair Material
Goodyear Tire & Rubber Co.

Tires (Truck, Passenger Car or Tractor)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Trailers
Marmon-Herrington Co.

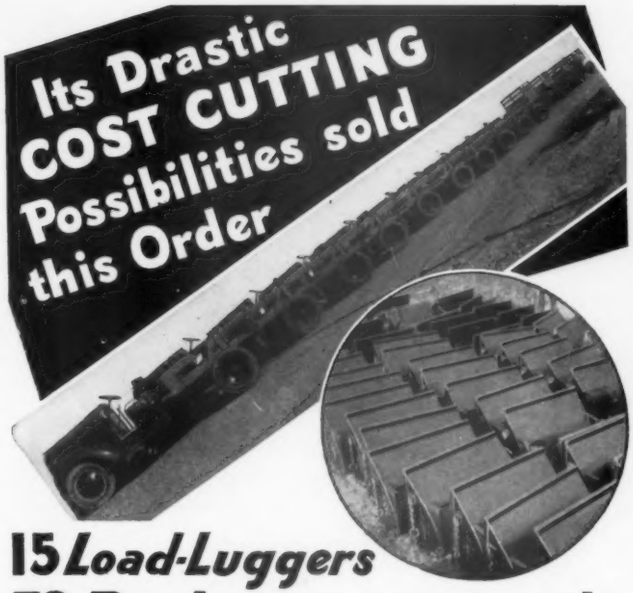
Trailers (Industrial)
Marmon-Herrington Co.

Tramways (Aerial Wire Rope)
*Roebling's Sons Co., John A.

Transformers
*General Electric Co.

Transmission Belting (See Belting)

*See also information in the 1939 Pit and Quarry HANDBOOK.

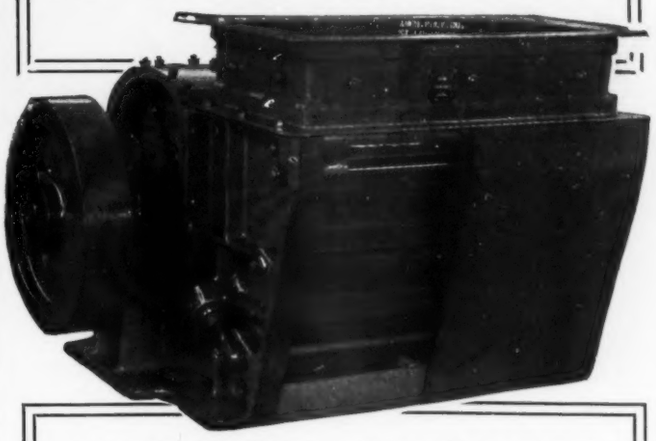


15 Load-Luggers 70 Buckets — one order

One simple demonstration will convince the most skeptical prospect that our cost cutting claims are sound . . . that the Brooks Load-Lugger is America's most effective . . . most versatile equipment for hauling and dumping any material, where loading is done by hand. When one Load-Lugger and four to eight Load-Lugger Buckets can replace several trucks, that's cost-cutting! Savings in operating cost alone pay for the Load-Lugger quickly. Write for "The complete Load-Lugger Story now."

BROOKS EQUIPMENT & MFG. CO.
11 Davenport Road,' Knoxville, Tenn.

PICK AN AMERICAN TO WIN
When Your Crusher must "Go the Route"



An AMERICAN Hammermill is reliable under all circumstances—a relentless and thrifty rock-punisher. It is especially recommended on those "dead-line" jobs where you can't afford "time-outs" for crusher repairs. Handles 10 to 100 tons per hour—*every* hour. Low power and maintenance costs make it profitable to keep this "finish fighter" in action.

Write for Bulletins
Send us your Inquiries

AMERICAN PULVERIZER COMPANY
1289 Macklind Ave. St. Louis, Mo.

Excavating • Conveying • Stockpiling

. . . AT LOWEST COST

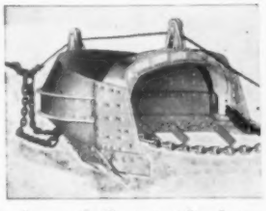
Use of Sauerman Crescent Scrapers in the excavation of sand and gravel and in the stockpiling of aggregates increases year after year.

You know the reason for this popularity if you have seen one of these Sauerman machines in operation. The Sauerman Crescent scraper bucket digs a capacity load in a few seconds, moves this load rapidly over the ground, dumps cleanly when it reaches the dumping point, and then returns at high speed to dig another load. Thirty to sixty loads are dug, hauled and dumped per hour, and the cost is one man's wages plus about 60c per hour for gasoline or electric power. (Note: This fuel or power cost is for a 1 cu.yd. unit, and larger or smaller machines require more or less power in proportion to their size.)

Tell us about your excavating and stockpiling problems and we will show you how you can cut your costs by using Sauerman equipment. Catalog with over 200 photographs, layout sketches and information tables mailed free on request.

SAUERMAN BROS., INC.
434 So. Clinton St., CHICAGO

½ cu. yd. Crescent bucket



3 cu. yd. Crescen t bucket

Sauerman ½ cu. yd. portable Scraper unit digs 25 cu. yd. per hour.

Keep your conveyor belts going with FLEXCO HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Five sizes in steel and alloys.

Folder WRP shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

FLEXIBLE STEEL LACING COMPANY
4623 Lexington St., Chicago

Write for your copy

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 96

Transmission Machinery
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.
*Smith Co., T. L.

Trucks and Trailers (See Motor Trucks)

Tubes for Tire Casing
Goodyear Tire & Rubber Co.

Tube-Mills (See Mills—Ball, Tube, etc.)

Turbines
*General Electric Co.

Unit Heaters
*General Electric Co.

Unloaders (Box Car)
*Barber-Greene Co.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Tyler Co., W. S.

Vibrators (Concrete)
Anchor Concrete Machinery Co.
*Multiplex Concrete Machy. Co.

Wagons (Dump)
*Koehring Co.

Washers (Sand, Gravel and Stone)
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Smidth & Co., F. L.
Smith Engr. Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Wearing Parts (Machinery) (See Machinery Wearing Parts)

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Fuller Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
McCarter Iron Works, Inc., The
*Merrick Scale Mfg. Co.

Welding & Cutting Equipment.
*General Electric Co.

Welding Supplies
*General Electric Co.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Winches and Capstans
Alloy Steel & Metals Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Wire and Cable (Electric)
*General Electric Co.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
*National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
*Tyler Co., W. S.

Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
*Roebling's Sons Co., John A.

Wire Rope Fittings
*American Cable Division of the American Chain & Cable Co., Inc.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
*Roebling's Sons Co., John A.

Wire Rope Slings
*American Cable Division of the American Chain & Cable Co., Inc.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
*Roebling's Sons Co., John A.

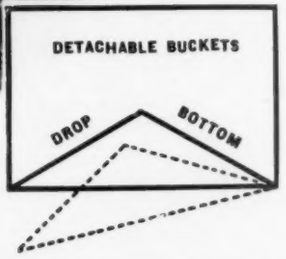
Wire (Welding)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

* See also information in the 1939 Pit and Quarry HANDBOOK.

DEMPSTER DUMPSTER

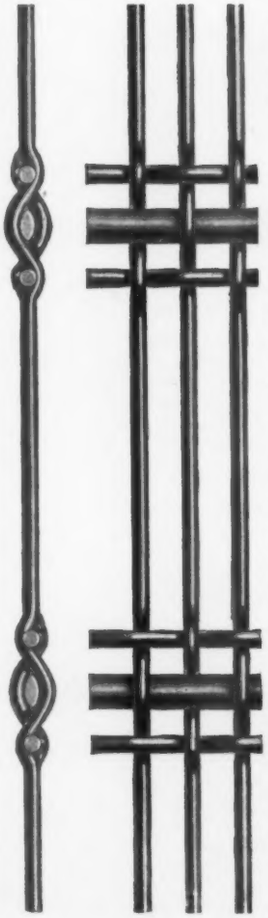
No Overhang
No Sideway
No Counterweight



Precision Controlled Dumping

Exclusive features and advantages such as superior bucket design, easier operating control, sturdier construction, and drop bottom have put the DEMPSTER-DUMPSTER "out in front" as material handling equipment. Buckets are carried up and on the truck chassis with more than 50% of the load ahead of the rear axle.

DEMPSTER BROS. INC.
KNOXVILLE, TENNESSEE



STA-TRU

Long-Mesh Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS

$17.50 PER SET

CAN BE QUICKLY ATTACHED TO YOUR OWN GRINDING EQUIPMENT

ROCK BITS KEPT SHARP

and drilling goes faster with a Pacific grinding attachment . . . Simple, convenient, practical . . . Any handy man can use it . . . No special form wheels needed . . . Designed for standard wheels easily obtained from your nearby dealer.

When ordering specify MAKE AND THREAD SIZE of bit to be ground.

The parts comprising this attachment are shown in lighter areas in above illustration. When desired, we can supply the complete unit including wheel, electric motor, etc.

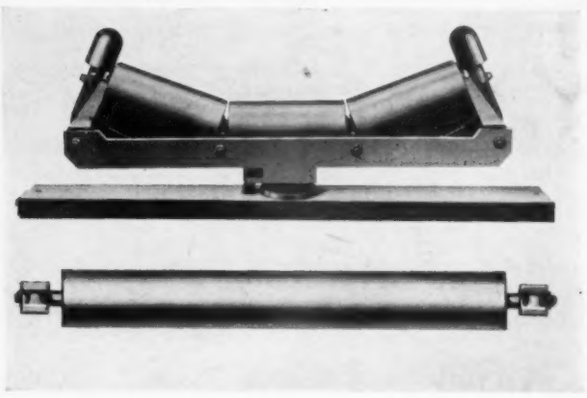
Ask Your Dealer

PACIFIC Detachable Drill Bit GRINDER

ALLOY STEEL & METALS CO.

1862 E. 55TH STREET • LOS ANGELES, CALIF., U. S. A.

Manufacturers of Pacific Jaw Crushers · Pacific Bit Grinders
Handy Hoists · Machinery Wearing Parts



TRAINING IDLERS

ROBINS MAKES: Belt Conveyors, Screens, Feeders, Gates, Bucket Elevators, Grab Buckets and all their accessories.

A crooked running belt is expensive, it causes excessive wear on belt edges. Robins Training Idlers prevent crooked running in both the carrying and return strands. Trainers substituted for about every sixth idler (Robins or other make) will keep belts in line.

ROBINS CONVEYING BELT COMPANY

MATERIAL HANDLING ROBINS EQUIPMENT

15 Park Row, New York, N. Y.

Offices in principal cities

Send for bulletins.

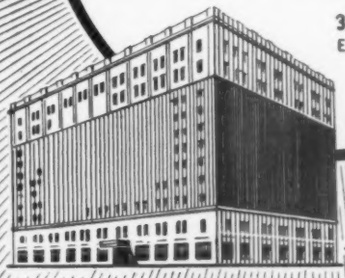
● RESIDENTIAL SURROUNDINGS

● COMMERCIAL LOCATION

HOTEL FORT WAYNE

In addition to the superior accommodations at the Fort Wayne, guests enjoy a superb location in a residential community, yet convenient to the business districts. Hotel Fort Wayne provides economy without sacrifice of comfort or location.

300 ROOMS EACH WITH BATH FROM $2



TEMPLE AT CASS

OPPOSITE MASONIC TEMPLE

DETROIT

Big Machine Value

In These Small Shovels

B. R. Acker Co., Inc., of Takoma Park, Md., is but another contractor who has recently switched to BAY CITY and is experiencing new economies in excavation—getting *big machine value* from his ¾-yard shovel. The simplicity of design, accessibility, ease of operation, speed and power of these rugged machines, fully convertible without machinery change are establishing new records of performance and economy. If you want real pay-dirt at lower operating and maintenance cost, we urge you to investigate the many advantages of the BAY CITY (⅜ to 1¼ yd.), as others are doing, before buying your next shovel. Start now by writing for Catalog H-3, No obligation.

Bay City Shovels, Inc., Bay City, Mich.

BAY CITY SHOVELS

SYMONS
CRUSHERS • SCREENS

FINER PRODUCT
GREATER CAPACITY
LOWER CRUSHING COST

These advantages have made Symons Cones first among reduction crushers.

SIZES CLOSER
SAVES HEADROOM
ACTION IS POSITIVE

The trend is definitely toward level screening. Again Symons leads the way!

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

COMPLETE CONVEYOR SYSTEMS ENGINEERED TO YOUR NEEDS Sprout-Waldron engineers will want to know the nature of material to be moved, the distance involved, the capacity required. Their job is to give you most efficient performance at lowest cost. Talk to a Sprout-Waldron sales engineer. There's no obligation, and he may be able to save you money. *Literature on request.*

SPROUT, WALDRON & CO. INC.
137 SHERMAN ST. MUNCY, PA.

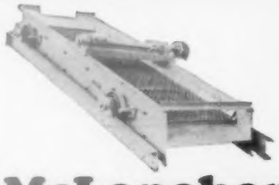
ELEVATORS, CONVEYORS, POWER TRANSMISSION EQUIPMENT

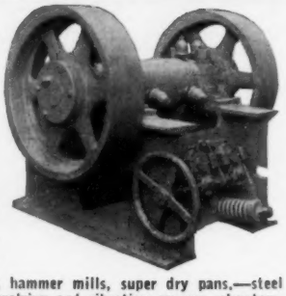
ROUND
SQUARE
SQUAROUND*
HEXAGON
PERFORATED
PLATE
of every description
for maximum productiveness from your vibrating screens.
*Reg. U.S. Pat. Off.

HENDRICK MANUFACTURING CO.
39 Dundaff Street, Carbondale, Pa.
Sales Offices in Principal Cities. Please Consult Telephone Directory

ROTARY KILNS
GRINDING MACHINERY
for cement, lime, ores, etc.

F. L. SMIDTH & CO.
225 Broadway New York, N. Y.





McLanahan Equipment

Single and double roll and jaw crushers, hammer mills, super dry pans,—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists,—complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation
Continuously in Business Since 1835
Hollidaysburg, Pennsylvania

ROL-MAN
TRUE MANGANESE STEEL
screens

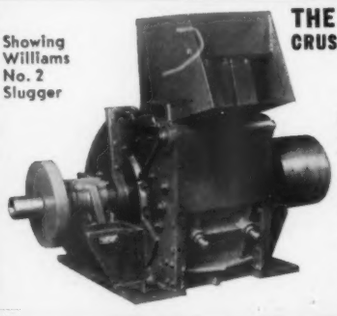
Highest abrasion resistance of any known steel. Double Lock Mesh Weave perpetuates initial accuracy for the life of the screen. Send for prices and performance facts.

MANGANESE STEEL FORGE CO., CASTOR AVE. & ALLEN ST., PHILA., PA.

CONVEYING SYSTEMS FOR PULVERIZED, FINE, CRUSHED & GRANULAR MATERIALS
FULLER-KINYON—FLUXO—AIRVEYOR
ROTARY FEEDERS - DISCHARGE GATES
FULLER ROTARY COMPRESSORS AND VACUUM PUMPS
AUTOMATIC BATCH WEIGHERS
BIN SIGNALS

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA
Chicago: Marquette Bldg. San Francisco: Chancery Bldg.

Showing Williams No. 2 Slugger



THE WILLIAMS "SLUGGER" CRUSHER *for* MAKING 1¼", ¾" OR AGSTONE
HANDLES LARGE STONE

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
802 St. Louis Ave. - St. Louis, Mo.

WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS

THE STRONG SCOTT MFG. CO.

MINNEAPOLIS, MINN.

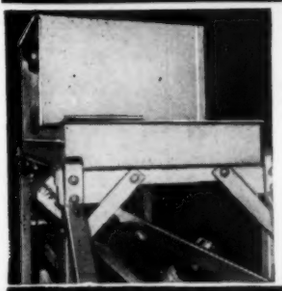
Manufacturers of

UNIT PULVERIZERS

for

DIRECT-FIRING KILNS,
DRYERS AND BOILERS

WEIGHING while conveying



The Vermont Asbestos Mines use two Merrick Weightometers. One for accurate recording of the amount of rock delivered to storage silo.

The other weighs the rock going from storage into mill.

WRITE FOR BULLETIN 375

MERRICK SCALE M'FG. CO.
PASSAIC NEW JERSEY

LIGHTNING

Heavy-Duty (Ball-Bearing)
Sand and Gravel Pumps

High efficiency—low operating cost—precision workmanship—wear-resisting, non-heating bearings even when operated under extremely high heads. WRITE

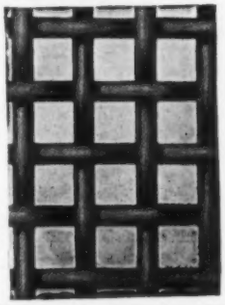
KANSAS CITY HAY PRESS CO.
KANSAS CITY, MO.

---

5 STAR FEATURES

Of Nat-Aloy Wire Cloth

- ★ Wears five times as long as cloth made of ordinary steel.
- ★ Withstands vibration without crystallization.
- ★ Super-tough to resist abrasion.
- ★ Maintains accuracy throughout life of screen.
- ★ Has outworn other special alloy cloths.



ATTRACTIVE PRICES
STOCK SHIPMENTS

NATIONAL WIRE CLOTH CO. INC.
ST. PAUL, MINN.

Write for New Catalog

1—24″x36″ Traylor Jaw Crusher.
1—18″x36″ Farrell Jaw Crusher.
1—10″x36″ Farrell Jaw Crusher.
1— 6″x36″ Farrell Jaw Crusher.
1—10″x20″ Farrell Jaw Crusher.
1—16″x36″ Buchanan Jaw Crusher.
1—15″x30″ Reliance Jaw Crusher.
1—40B Telsmith Gyratory Crusher.
1—4′x12′ Triple Deck Kennedy Vibrator Screen.
1—3′x10′ Double Deck Telsmith Vibrator Screen.
1—3′x8′ Double Deck Telsmith Vibrator Screen.
No. 7 and No. 8 Telsmith Sand Tanks.
1—New Triplex Road Pump.
1—No. 6 Traylor Finishing Crusher.
1—24″x150′ Belt Conveyor.
1—30″x102′ Belt Conveyor.
1—Screw Washer.
1—48″x20′ Washing Screen.
1—42″x48″ Traylor Jaw Crusher.
1—30″x36″ Farrell Jaw Crusher.
1—30″ Kennedy Gearless Gyratory Crusher.
1—18″ Kennedy Gearless Gyratory Crusher.
1—No. 37 Kennedy Gearless Gyratory Crusher.

BLUE BALL MACHINE WORKS
BLUE BALL, PA.

CRUSHERS

GYRATORY: 42″ McCully with 80% brand new parts. 36″ Allis-C. 20″ Super. McCully conv. to 16″. Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″, 10″, 12″. Super. McCully 6″ & 10″. Newhouse 5, 7 & 10″. Symons Cone & Disc. Ty. 2′ to 4′.

ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16. Etc., Etc.

HAMMERMILLS: Williams Nos. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. March 8x6 & 10x9. Hardinge 6′x3′, 8′x30″ & 6′x9′. Misc. Tube Mills 5′ & 6′x22′. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices.

(I have equipment at many points in the United States and Canada. What you need may be near your plant.)

ALEX T. McLEOD
7229 Rogers Avenue CHICAGO

EQUIPMENT FOR SALE CHEAP

1—Vulcan 40 ton Std. Ga. Saddle tank locomotive.
1—Marion 1 yd. Steam crane 40′ boom on cats.
1—Russell Grader, 10′ Blade.
1—Link-Belt K-30 Trench Hoe, 45′ Boom.
1—Link-Belt K-44 shovel 50′ boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
2—Whitcomb 12 Ton 36″ Gauge Locomotives.
2—C. P. Compressors, 590 cu. ft., 100 h.p. motor.
2—Worthington Compressors, 621 cu. ft., 75 h.p. mtr.
1—Monarch 75 Caterpillar with bulldozer.
1—Sullivan 310′ portable compressor.
1—Ingersoll-Rand pavement breaker.
6—Easton 4 yd. all steel 36″ Ga. cars.
4000′ of 9″ x 9″ road forms.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—Schramm No. 120 Compressor.
1—1 yd. Owen Bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
1—Le Courtney 6″ Cent. Pump, 40 h.p. motors.
1—Morris 8″ dredge pump, 150 h.p. G.E. motor.
1—Morris 10″ cent. pump, 2250 GPM at 130′ head.
1—Goulds 12″ cent. pump, 50 h.p. G.E. motor.
1—Thompson 6″ self-priming pump, Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6″ self-priming pumps, gas motor.
1—Humdinger 4″ self-priming pump.
1—Humdinger 2″ self-priming pump.
1—Domestic double diaphragm pump, gas motor.
1—G.E. motor, 200 h.p. slipring.
2—No. 9 B 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

HARRY C. LEWIS
325 Frelinghuysen Avenue Newark, N. J.

Jaw Crushers—4″x8″ up to 66″x84″.
Crushing Rolls—16″x10″ up to 54″x24″—Gyratory Crushers
Ring Roll Mills—No. 0 and No. 1.
Swing Hammer Mill.
Rotary Fine Crushers—No. 1, No. 0.
Direct Heat Rotary Dryers—3½′x25′, 4′x30′, 5′x30′, 5½′x40′, 6′x50′, 7′x50′ and 8′x50′.
Semi-Indirect heat Dryers—4′x30′, 4½′x26′, 5′x30′ and 8½′x75′.
Cement Kilns—3′ up to 8′ diameter.
Hardinge—Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0 and No. 1 and No. 5 roll
Tube—Rod and Ball Mills—3′ to 8′ diameter.
Vibrating Screens—Air Separators.
1—4′x4′ Ball Mill.
New Dryers built for all purposes.

W. P. HEINEKEN
95 Liberty St., N. Y. Tel.: Barclay 7-7298

FOR SALE

2—Page No. 411 walking draglines, diesel, one 70 ft. boom, one 60 ft. boom, with Page 1¾ yard automatic dragline buckets.

4—Seven ton Plymouth gasoline locomotives, gear driven.

1—American Hoist, 3 drum with swingers, 57 H.P. Waukesha motor.

All equipment in first class condition.

BIRCH CREEK COAL COMPANY, INC.
Brazil Indiana

SHOVELS—CRANES

1—Lima Model-602 Gas Shovel No. 495, 1½-yd. first class, late 1936.

1—Lorain 75-B 1¼-yd. shovel attach. 21′ Bm. 16′ Dipper Stick.

1—Mead-Morrison ⅝-yd. Gas Shovel, also ½-yd. Backhoe attach. and 35 ft. crane boom, repaired.

1—P & H Model-705 Diesel Crane and Dragline, 70′ Boom. New 1937.

1—Northwest No. 4 Gas Crane, 50′ Boom.

1—Universal Truck-Crane No. 1400—solids.

1—Lorain-40 Truck-Crane—pneumatics.

GREY STEEL PRODUCTS CO. INC.
74 Central Ave. Glen Rock, N. J.
Tel. Ridgewood 6-2275

Consolidated Offers:

JAW CRUSHERS:

42 x 48″ Traylor; 24 x 36″ Allis-Chalmers; 24 x 36″, 18 x 36″, 30 x 15″ Farrel.

REDUCTION GYRATORY CRUSHERS:

4′ Traylor No. 410 TZ, 100 t.p.h., ¾″; No. 19, 25, 37, 49 Kennedy; 5″ Newhouse with 40 H.P. motor; 2′ Telsmith Gyrasphere.

BELT CONVEYORS:

(One) 20″ x 212′ ROBINS Timken equipped 253 XR idlers on steel channel bases, all mounted on steel frames in 20 ft. sections, complete with motor drive through Falk gear reducer and gravity take-up.
128 Troughing Idlers and 52 Return Idlers, for 18″ Conveyor.

CRANES AND SHOVELS:

1—25 ton **Browning Locomotive Crane,** double drums, 50′ boom, standard gauge, 160 lb. ASME boiler, new 1938.
1—Lima Model 602 Gasoline driven Crawler Shovel, 1½ yd. dipper.
1—75B Lorain 1¼ yd. Gasoline driven Shovel. 1935.
1—Marion ¾ yd. All Electric Model 21 Crawler Shovel.
1—Marion 450 Combination Shovel and Crane, 1¼ yd. dipper, 50′ crane boom.
1—Marion 371 Dragline Crane, 1¾ yd.
1—"GENERAL" ½ yd. Caterpillar Shovel and Crane.
1—Bucyrus 50-B 2 yd. Shovel.
1—NORTHWEST Model 78 Shovel, 2 yard, like new.
1—100-B BUCYRUS Electric Shovel, Ward Leonard control, 3 yd. Dipper.
1—100-B BUCYRUS Steam Shovel, 3 yd. full revolving.
1—No. 8C BROWNING Locomotive Crane, 25 ton capacity, 50′ boom, standard gauge, double drums, 160 lb. ASME boiler.

VIBRATING SCREENS:

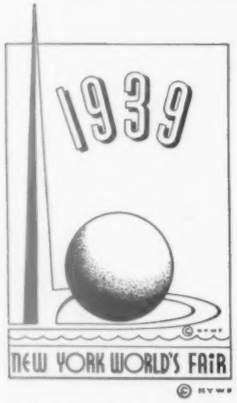
7—Jeffrey Traylor Vibrating Screens—Electric; 2 FB-2; 41″ x 6′; 5 FB-4, 4′ x 7′. Also three Motor Generator Sets for these screens.
2—Niagara 4 x 8′ double deck; 2—4 x 8′ Robins double deck; 4—3 x 6′ Sturtevant M-V, double deck; Tyler Hummer 3 x 5, 4 x 5, 4 x 7.
1—Rotex "Jumbo" with 2—3 x 11′, 3-deck, on common frame.
3—ROTARY SCRUBBERS, GOOD ROADS, 4′ x 6′, 2—4 x 8′, each with 20 H.P. motor.
2—WASH BOXES, 18′ c/c with 3′ blades; 24′ c/c with 4′ blades.

AIR COMPRESSORS:

2—310′ Ingersoll-Rand Portables, on AB Mack trucks, dual pneumatic tires; also 2—220 CFM., same mounting.
2—POC 2 I-R Diesel driven 550 CFM., 100 lbs.
1—PRE—2 I-R 1300 ft. with synchronous motor.

ROTARY DRYERS:

8—Direct Heat; 3 x 20′, 4 x 30, 5 x 26, 5 x 30, 5 x 40, 6 x 60, 8′ 8 x 85′.
5—ROTARY KILNS: 7 x 100′, 8 x 110′, 8 x 125′.



Visit ous. 8-acre Newark Shops on your way to the N. Y. World's Fair

SPECIAL OFFERINGS IN PLANT CLEAN-OUT:

2—4-roll Raymond High Side Pulverizers.
1—5 x 30′ Ruggles-Coles Direct Heat Rotary Dryer.
1—30 x 54″ Ocala Single Roll Crusher.
1—No. 4 Williams Jumbo Hammer Mill.
8—18″ Belt Conveyors, various lengths.
2—40′ Bucket Elevator, 9 x 18″ buckets.
1—No. 30 Caterpillar Tractor.
1—60 H.P. Fairbanks-Morse Diesel Engine.
1—10 x 8 Ingersoll-Rand Air Compressor.
1—6″ Blast Hole Drill, Loomis, "Clipper" wire line, gasoline driven, traction.

• *Write for Detailed Illustrated Circulars—Address All Inquiries to:*

CONSOLIDATED PRODUCTS CO., Inc.

17-19 Park Row NEW YORK CITY BArclay 7-0600

CONTRACTORS' EQUIPMENT

25 ALL-STEEL ROCK CARS

Length 29′, Width 8′, Cast Steel Trucks
CUBICAL CAPACITY, 1160 CU. FT. LOW PRICED
Especially suitable for ballast loading or contracting work

70 WESTERN DUMP CARS

12 CUBIC YARD CAPACITY
19′ length, 9′ width, 22½″ sides
PRICED FOR IMMEDIATE SALE

25—40-ton steel u/f flats
20—50-ton steel u/f flats
200—30-ton steel u/f box cars
25—50-ton all steel gons.
25—30-ton steel gondolas, St. Ga. Blt. 1926
Used and Tested Freight Car Replacement Parts

Locomotive Cranes—Saddle Tank Locomotives

RAILS

Complete Stocks of 90 lb., 85 lb., 75 lb., 70 lb., 65 lb., 60 lb. and lighter weights, complete with angle bars, carried at principal points throughout the country, available for rail or water shipment.

HYMAN-MICHAELS COMPANY

122 South Michigan Ave. Chicago, Illinois
St. Louis • New York • San Francisco • Seattle

FOR SALE

1—300 HP Winton Diesel Engine direct connected to 150 KW generator set.
1—150 HP Fairbanks-Morse, style Y, type V Diesel Engine complete with starting equipment.
1—100 HP Fairbanks-Morse, style Y, type V direct connected to 60 KW generator set and exciter.
2—100 HP Tipps Diesel Engine.
1—200 HP McIntosh-Seymour Diesel Engine direct connected to 120 KW generator set and exciter.
2—25 HP Fairbanks-Morse horizontal Diesel Engines style Y.

Also several other makes of Diesel Engines as well as electric motors and transformers.

The above Diesels are priced low for immediate sale and can be inspected and seen running. For further information wire

SOUTHERN MACHINERY CO.
Brentwood Maryland
Direct wire with Postal Telegraph

OPPORTUNITY

Silica-Tripoli plant located Tennessee Valley, 2 tons per hour production. Opening for one capable of assuming charge of production or sales and able to purchase up to half interest. Cheap power and low freight to consuming points. Enormous deposits of crude. Plant in production on unfilled orders to satisfied customers but needs additional capital. This proposition warrants your investigation as it is one of unusual possibilities.

Send replies to
BOX 618
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

BRAND NEW WIRE ROPE FOR SALE

1″ dia. 6x19, Plow and IMPROVED PLOW STEEL 100,000 ft. Lengths run, 1000′ to 2500′ each reel.
⅝″ dia. 6x19, PLOW and IMPROVED PLOW STEEL 86,000 ft. Lengths run from 1200′ to 5000′ each reel.
ALSO HAVE: ⅜″; ⅞″; 1⅛″; 1⅜″; 1½″; 1¾″; 1⅞″; 2″; 2¼″.
EVERY FOOT OF THIS CABLE IS BRAND NEW. IMMEDIATE SHIPMENT FROM STOCK. ATTRACTIVE PRICES.
TERRENCE P. WYNN
55 West 42 St. New York City

SACRIFICE BARGAINS

Following Equipment in Good Condition

36—Western 5 yd. 36″ ga. dump cars.....$100 ea.
10″ Amsco sand pump.....$345
17 ton Industrial Loco. Crane, 40′ boom.....$1500
2—32 ton Vulcan Std. ga. Stm. Loco.....$1500

Send all replies to
Box 627
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

FOR SALE—CHEAP

One steel dredging boat in 4 sections, each section 8 feet 9 inches wide, 14 feet long and 3 feet high, all sections bolted together and easily dismantled; quarter inch steel used in construction, thoroughly ribbed at bottom and also for length and width with angle iron.

Address replies to
BOX 609
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

AIR COMPRESSORS

Portable and stationary, belts with elec. or gas power, sizes from 2 cu. ft. to 1,000 cu. ft.

BINS

1—3 compart., 150 ton Blaw Knox with scales 10,000 lb. cap.
8—2 compart.: 1—118 ton Blaw Knox; 2—80 ton Heltzel; 1—54 yd. Johnson; 1—60 ton Butler; 2—35 ton Blaw Knox; 1—26 ton Heltzel. With or without weigh batchers.
1—1,200 bbl. Blaw Knox round bulk cement bin with 2,000 lb. weigh batcher.
1—275 bbl. Johnson port. bulk cement plant with 1,000 lb. weigh batcher, bucket elevator and car unloader.

BUCKETS

35—Williams, Blaw Knox & Owen clamshell, all sizes & types.
7—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 5—Page; 1—1½ yd. class C; 2—1¼ yd. class C; 1—1 yd. class M; 1—¾ yd. class C.
4—Dragscrapers; 1—1 yd. Sauerman LeClair; 1—1 yd. Green; 1—½ yd. Green; 1—1½ yd. Sauerman.

CRANES, DRAGLINES & SHOVELS

1—Link Belt K-55, ser. No. 1698, 70′ boom, 2 yd. bucket; also have 2 yd. shovel attachment.
1—P&H mod. 650, ser. No. 4188, 65′ box type boom, 1¼ yd. bucket.
2—Northwest mod. 104, ser. Nos. 2079 & 1597, 45′ boom, 1¼ yd. bucket; one with 1 yd. shovel attachment.
1—Link Belt K-42, ser. No. 1265, 45′ boom, 1¼ yd. bucket; also have 1 yd. trench hoe attachment or 1¼ yd. shovel front.
2—Northwest mod. 105, ser. Nos. 2053 & 1522, 40′ boom, 1 yd. bucket.
1—Link Belt K-1, ser. No. 1024, 50′ boom, 1 yd. bucket.
1—Moore Speed Crane, ser. No. 179, 60′ boom, ¾ yd. bucket.
2—Osgood Heavy Duty, ser. Nos. 2069 & 2087, 40′ boom, 1 yd. bucket & one with 1 yd. shovel attachment.
2—Thew mod. O gas shovels, ser. Nos. 2801 & 2687, ¾ yd. shovel fronts—with 40′ crane boom.
1—P&H mod. 206 with 42′ boom, ¾ yd. bucket.
1—Universal mod. 35, ser. No. 1200, 56′ boom, ½ yd. bucket.
1—Byers Bearcat mod. 37, ser. No. 3299, 30′ boom, ½ yd. bucket.
1—Erie type B, ¾ yd. comb. steam shovel & crane, 40′ boom.

CRANES (Gasoline Locomotive)

1—12 ton Brownhoist gas crane No. 2, ser. No. 8881, 8 wheel, 40′ boom.

CRUSHERS

4—Jaw Crushers: 1—12x26″ Champion; 1—10x20″ Climax No. 2½; 1—9x16″ Telsmith No. 9-A; 1—9x15″ Champion.
4—Gyratory; 1—No. 20 Kennedy; 1—Weston 36-B fine reduction type with 50 HP motor. Cap. 90 TPH of 1″ mat. 1—No. 3 McCully; 1—No. 0 McCully.
1—Set of Allis Chalmers smooth type crushing rolls, 42x16″.

DERRICKS

5—Steel stiff leg; 1—20 ton Overland, 110′ boom; 1—15 ton Clyde, 50′ boom; 1—15 ton Clyde "A" frame barge derrick, 50′ boom; 1—10 ton Insley, 80′ boom; 1—5 ton Insley, 80′ boom.
6—Steel guy derricks; 1—15 ton Terry, 115′ mast, 100′ boom; 1—10 ton American, 115′ mast, 100′ boom; 3—6 ton Bedford, 90′ mast, 80′ boom; 1—5 ton Dobbie, 70′ mast, 58′ boom.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75′ boom, SD Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

Send for New Orange Peel Stock List

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA	CHICAGO	PITTSBURGH
1505 Race St.	1160 S. WASHTENAW AVE.	P. O. BOX 933
PHONE GRANITE 7600	PHONE NEVADA 2400	PHONE FEDERAL 2000

FOR SALE

Sullivan 315 ft. compressor, rebuilt, cheap.
Barber-Greene No. 42 loader, swivel spout.
Caterpillar 30 with bulldozer.
Universal truck crane on Mack truck.
Bay City 1 yd. shovel, rebuilt, guarantee.
Buckets, conveyors, air tools, pumps, etc.

TRACTOR & EQUIPMENT CO.
433 S. Jefferson St., Chicago, Ill.
Branch: 2272 S. 7th St., Springfield, Ill.

ATLANTIC SPECIALS!!

LOCOMOTIVE CRANE

1—25 ton Browning Locomotive Crane Model 8C. Mounted on 8 Wheel MCB trucks, double drums for clamshell operation, 55′ lattice steel boom, fitted with separate swinging engine. Has National Board Boiler. Crane is 1928 Model. Condition excellent.

GASOLINE LOCOMOTIVE

1—20 ton Plymouth, standard gauge, gasoline Locomotive. Standard model throughout. Fitted with MCB Couplers, Air Brakes, Electric Starter and Electric Lights. Full steel cab. Excellent condition. Used for two years only on intermittent service.

ALL THE ABOVE AVAILABLE FOR IMMEDIATE SHIPMENT

ATLANTIC EQUIPMENT CORP.
50th and Grays Ave.
PHILADELPHIA, PA.
Tel. Evergreen 6363

36″-w. Equipment for 130′ Belt Conveyor.
30″-w. Equipment for 350′ Belt Conveyor.
18″ Robins Belt Conveyors, 260′ and 125′.
2—24″ Automatic Belt Conveyor Trippers.
36″ Link-Belt Selfcontained Apron Feeder.
30″x32′ L-B Package Conveyor, steel frame.
48″ Belt Elevator, 14″ Buckets and Frame.
16″x50′ and 14″x32′ Chain Bucket Elevators.
34′ Enclosed Chain Elevator, 10″ buckets.
4 Encased 35′ Belt Elevators, 5″ buckets.
New 22″x150′ Rubber Covered 8-ply Belt.
Selected Lot—Chain, Sprockets, Buckets.
Farrel type B Jaw Crusher, 36″x15″.
Telsmith 6-B Primary Gyratory Crusher.
Traylor "Bulldog" 8″ Gyratory Crusher.
Jeffrey Swing Hammer Mill, 15″x8″.
Hardinge Pebble Mill, 8′x22″.
3x6 Leahy 2-d. Vib. Screen, Motor Drive.
4x8 Robins Gyrex 1-deck Vib. Screen.
4x8 Huron 3-deck Vib. Screen, 7½ hp.
8—3x5 and 4x5 Hummer Vib. Screens.
6x5 Hummer 1-deck Screen, 2—V16 heads.
1¼ Marion Electric Shovel, on Cats.
Bucyrus-Erie ¾ Steam Shovel Front.
½ yd. Sauerman Cresc. Dragline Buckets.
2 LeClair 1-yd. Dragline Buckets, Open.
¾ yd. Blaw-Knox Clamshell Dig. Bucket.
½ yd. Hayward Clamshell Material Bucket.
Centrifugal Electric Water Pumps.
60 hp. Variable Speed 1-drum Mine Hoist.
Ingersoll-Rand Tugger Airhoist, type 1H.
50 hp. Motor Slipring 3-220—1800 R.P.M.
660′ Worthington Duplex Air Compressor.
800 hp. Kelley Feed Water Heater, coils.
Cletrac No. 40 Tractor on Cats., 40 hp. eng.

G. A. UNVERZAGT
15 Park Row, New York City

FOR SALE

Compressor—Sullivan, model 160 two stage, Air Cooled, Gasoline Powered, Portable, Steel Wheel mounted, Actual Capacity 160 cu. ft. per min. 100 lb. pressure, condition excellent.

Locomotive—Vulcan 32 ton standard gauge, 4 wheel saddle tank, 190 lb. code boiler.

Mixer—Smith 56 S Tilting type, 2 cu. yd. capacity concrete mixer like new.

E. E. FORT
1119 S. 56th St. Philadelphia, Pa.

ELECTRICAL EQUIPMENT

1100 CFM Bury 100 lb. air compressor.
368 CFM Ing. Rand 100 lb. air compressor.
573 CFM Gard. Den. 55 lb. air compressors (3).
8″, 10″, 12″, 14″, 16″ centrifugal pumps.
200 & 300 amp. motor driven arc welders.
170 KVA & 300 KVA Fair. Morse Diesel generator sets, 3/60/480 or 240 volts.
500 KVA 900 RPM synchronous condenser.
1600 HP 2300 volt 277 RPM slip ring motor.
650 HP 90% P.F. 1200 RPM synchronous motor.

● ● ●

Complete stock of motors up to 2500 HP, air compressors, transformers, generators, motor-generator sets, pumps, etc. Fully guaranteed. For sale or rental at reasonable prices. We will buy or take in trade your surplus electrical equipment.

CHICAGO ELECTRIC COMPANY
1334 W. 22nd St. Chicago, Ill.

RECONDITIONED
PULLEYS
BELTING, PIPE, ETC.

E. COHN & SONS, INC.
CEDAR RAPIDS, IOWA

FOR SALE

TWO DRAGLINES
PRICED FOR QUICK SALE

Page Crawler Dragline, 1¾ cubic yard bucket, 70 foot boom, Page Diesel Engine Power.

Bucyrus Class 14 Crawler mounted Dragline, 2¾ cubic yard bucket, 70 foot boom, Diesel Electric powered.

Write for location and more detailed information.

Address all replies to

BOX 515

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

CONCRETE—CEMENT—EQUIPMENT
Johnson concrete batching plant, complete, 100 yds. cap. with 300 bbl. cement bin, elevator, screw conveyor, etc. New 1937.
250 bbls. Blaw Knox cement bin, elevator, screw conveyor, weigh batchers, etc., complete plant.
155 bbls. Fuller cement bin, electric weigh batchers.
1—250 yd. 2 compartment Butler steel bin.
300 bbls. Heltzel cement bin, screw conveyor, elevator.
2—Smith 1 yd. tilting concrete mixers, water tank, hopper, and telltale, electric motor driven.
1 Fuller Kinyon Type B portable cement loader.
1 Fuller Kinyon rotary air compressor.
CRUSHERS—JAW—CONE—GYRATORY
Jaw—6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36, 42x60.
Gyratory—Gates K, Nos. 4, 5, 6, 7½D, Kennedy, Van Saun, Nos. 30, 37, 37S, 49, McCully Nos. 5, 6, McCully Superior 8″.
CRANES—SHOVELS—DRAGLINES
1 Clyde Whirley, 30 tons cap., 105′ boom, oil fired steam.
1 Bucyrus Erie steam shovel, 2 yds. capacity.
1 Marion No. 450 gas-electric shovel, 1¼ yd. cap. Guaranteed.
1—43B Bucyrus Erie Diesel shovel, 2 yds.
1 Lima, gas, caterpillar, 1¼ yd. crane-dragline.
CLAM SHELL—ORANGE PEEL BUCKETS
1—Williams Hercules 1½ yd. digging clamshell, NEW.
1—Owen ½ yd. clamshell digging bucket, type M.
CONVEYOR EQUIPMENT
Barber Greene conveyors, 24″, steel frames.
Electric drive, 35′ to 45′ type N.
Belt conveyors, complete, steel frames, belt and motors, 24″, lengths, 45′ to 200′.
Conveyor belt, 18″, 20″, 24″, 36″.
Head & Tail pulleys, take-ups, rollers, idlers.
MISCELLANEOUS
5—Mack Model AB dump trucks, pneumatic.
Dredge pumps, 6″, 8″, 10″, 12″, 16″.
Gas locomotives, 2½ to 35 tons.
V type, side dump steel cars, 2 & 3 yds., 36″ ga.
1 American steel stiff leg derrick, 100′ boom, 15 tons cap.
Clyde steel stiff leg derrick, 80′ boom, 10 tons.
Clyde 3 drum hoist and swinger, electric, 75 HP.
1—3′x6′ vibrating screen, 3 decks, K.V.S.
1—3′x6′ vibrating screen, single deck, K.V.S.
1—Lawrence centrifugal pump, 8″x8″, gas, portable.
1 Double drum steam hoist, 8½x10, code boiler.
2 Double drum steam hoists, 7x10, code boiler.
RICHARD P. WALSH CO., 30 Church Street, New York, N.Y.

FOR SALE

At a bargain—TUBE MILL, Silex lined in first class condition, 22′ x 6′. Complete with 150 HP motor, charge of French pebbles and charge of steel slugs.

SHELLBUILDER COMPANY
Houston, Texas

FOR SALE

3—Apron Feeders A1. Bargain.
2—½ yd. shovels—combination.
2—Barber-Greene loaders.
1—No. 8 Allis-Chalmers crusher.
1—Portable Hammer Mill complete with power.

F. W. HERKEL
3621 Kenilworth Ave. Berwyn, Ill.

SEND US YOUR INQUIRIES

¾ yd. Northwest No. 3 Shovel & Dragline. Rebuilt.
140 HP Fairbanks Morse "32" Diesel with Clutch.
40 HP Fairbanks Morse "VA" Diesel. Belt Drive.
2—Buda 100/150 HP 6 cyl. Gasoline-Oil Engines.
45 ton Plymouth Gas-Elec. Locomotive. New 1932.
20 ton Whitcomb std. gauge Gasoline Locomotive.
16x12" Sullivan & 14x10" I-R Air Compressors.
All Sizes Crushers—Shovels—Cranes—Compressors.

MISSISSIPPI VALLEY EQUIPMENT CO.
501 Locust St. St. Louis, Mo.

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C. for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
FORT WAYNE, IND.

FOR SALE

Complete 36" gauge railroad.
15 Whitcomb gasoline and 10 Jeffrey electric (220-250 V. D.C., Trolley Type) locos, ranging in size from 4 to 20 tons, 200 5 cu. yard cars, tipple, 45, 60 and 75 lb. rail, switches, ties, track scales, etc.
All in good operating condition—most items still in use. Subject to prior sale.
Send replies to

BOX 612
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

FOR SALE—A Good Time to Buy

Loco. turntable—R. R. Scale—Aerial tramway.
Crushers Jaw 24x36-30x42—(2) 60x84-66x84.
Shovels 100B—70M—P & H 900—75B.
Crushers Gyr. 42—37—19—8K—8L—Aus. 105-6-7.
Quarry Cars 8 yd. S/G with tipple and hoist.
Crushers—Rolls—(2) 72x20-16x42-36x16.
Draglines 6W—Page 420—175B—3T—Cl. 24.
Locos. (3) 20 Ton—12 Ton—8 Ton all 36" ga.

A. V. KONSBERG, 111 W. Jackson Blvd., Chicago

1—Bucyrus Erie GA 2 1¼ gas air shovel serial 4366, $2750.00. Located our yard, Baltimore.

D. C. ELPHINSTONE, INC.
115 S. Calvert St., Baltimore, Md.

FOR SALE

One Ingersoll-Rand air compressor; type XCB-2; 676 cu. ft.; 100 lbs. pressure; belt driven. Been used 6 months only. Price right.

WILLIS VENABLE
45 Abbott Ave.
Barre Vermont

Bucyrus Cl. 24 Diesel-Electric drag., 115' boom.
Cranes-Drags.—P&H 700 & 600. NW 95-85-105-3- & 2.
Shovel Attachments—For P&H 206 & 300. Trench hoes.
Barber-Greene Loaders—Models 21-25-42- & 82.
Drag Scraper Outfits—4-3-2½-2-1½-1-¾ & ½ yd., Msc. hoists, buckets, etc.; Sauerman ½ yd. gas slackline.
30' B-G Coal Conveyor, crawler type. Overhauled.
Buckets—Clam.-drag.-scraper-orange peel, ¼ to 4 yd.
Dredge Pumps—6", 8", & 10". Also 45' Swintek.

JAMES WOOD
53 West Jackson Blvd., Chicago, Ill.

SAVE

Bolted type steel bins will cost you less erected than ordinary wood bins.

New and Used Pipe and Tubing

Jos. Greenspon's Son Pipe Corp.
Natl. Stock Yds. (St. Clair Co.) Ill.

WE LOOK INTO THE EARTH

By using Diamond Core Drills We drill for Limestone, Gypsum, Talc. Fire Clay. Coal, and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

FOR SALE

TRANSIT TRUCK MIXERS: One 1935, three 1936 Model 1½ yd. Blaw Knox Truck Mixers mounted on 1936 V-8 Ford Trucks S. W. B. Good condition. $1350.00 each unit with truck F. O. B. Stillwater, Okla.

ROY T. HOKE LUMBER CO.
STILLWATER OKLA.

CONVEYOR BELTING & BUCKET ELEV. BELTS FOR SALE

42" wide x 130 ft. long, 5 ply HEAVY DUTY.
36" wide x 325 ft. long, 5 ply HEAVY DUTY.
30" wide x 47 ft. long, 5 ply HEAVY DUTY.
24" wide x 345 ft. long, 5 ply HEAVY DUTY
12" wide x 105 ft. long.
Bucket elev. belts: 12" wide belt, with 10" bucket attached. 71 ft. and 47 ft. each length.
Attractive prices. Immediate shipment.

TERRENCE P. WYNN
55 West 42 St. New York City

O. C. HOFFMAN, Pres. L. H. HOFFMAN, Treas.

DIAMOND CORE DRILLING

HOFFMAN BROS. DRILLING COMPANY
PUNXSUTAWNEY, PA.

We drill for any mineral. We have more than forty steam, electric and gasoline drills, adapted for any job. Satisfactory cores guaranteed. Our prices are right.
Established 1902 - - - - - Telephone No. 382

100000 ITEMS

- Motors
- Generators
- Transformers
- M G Sets

Wire—Write—Phone

ERIE ELECTRIC MOTOR REPAIR CO., INC.
124 Church St. Buffalo, N.Y.

FOR SALE

Gravel plant consisting of portable gyratory crusher and portable bin with bucket elevator and shaker screen. Price $450.00.
Truck Crane, Orion gasoline operated, ½ yd. capacity.
Slackline Hoist, Thomas, 55 H.P. two drum electric.

P. A. HENAULT
2140 Book Bldg. DETROIT, MICHIGAN

FOR SALE

15" Electric Steel Hull Portable Dredge.
10" Steel Hull Portable Hydraulic Dredge.
20" Dredge Pump, New.

H. P. GUION
Dredge Broker
303 W. 42nd St. New York City

RAILS "1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money.
'Phone, Write or Wire.

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

Wanted—BLOWER

12,000 cu. ft. capacity at 15 lbs. pressure for altitude of 3,000 ft. Motor driven.

STEPHEN A. DOUGLASS CO.
660 Fort Washington Ave.
New York N. Y.

WANTED

Experienced Quartzite Quarry Plant Superintendent for crushing and rip rap operations Central States. State qualifications, references and salary expected.

Address replies to
BOX 621
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

RELAYING RAILS

All sections new and relaying rail, spikes, bolts, frogs, switches, "V" Shaped, flat and Contractors' Cars, etc. Prices cheerfully quoted.

M. K. FRANK
480 Lexington Ave., NEW YORK CITY
25 St. Nicholas Bldg., PITTSBURGH, PENNA.

WANTED

Barber-Greene Bucket Loader, crawler mounted.

FOR SALE

15x36 Diamond Crusher, Good Roads Crushers, Caterpillar Tractors, LeTourneau Scrapers and other equipment.

ROY C. WHAYNE SUPPLY CO.
Louisville, Ky.

WANTED TO BUY

Complete used McCracken roller packer head type concrete pipe machinery for sizes 12"-15"-18"-24"-30" and 36", both socket and tongue and groove. Must be in good condition and a bargain.
Send all replies to

BOX 615
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

3—50 HP. electric shaft hoists.
⅝ yd. Byers shovel.
⅛ yd. Byers comb. shovel-crane.
Owen & Williams ¾ and 1 yd. buckets.
Compressors: 110, 275, 310, 446 CF.
Barnes pumps S.P. 3, 4, 6 gas & elec.
Worthington 3" pump elec. 75 ft. head.

J. T. WALSH
Brisbane Bldg. Buffalo, N. Y.

WANTED

JAW CRUSHER 15" x 36" or similar size. Roller or Ball Bearings. Must be A1 condition.

CORD & SON
Versailles Indiana

FOR SALE

One Barber Greene Steel Conveyor without belt. 30 ft. long, to take 20" belt.

WANTED TO BUY

2 or 3 arm spider for Gates Style K No. 4 Crusher.

HELLER STONE COMPANY
R. R. No. 1 Bluffton, Ind.

FOR SALE

No. 1 Miles Block Machine, strike of plate and moulds, automatic tampers, new condition $325.00

J. W. HASENFLU COMPANY
Sharon Pennsylvania

WANTED

Second-hand Tube Mill 5x22. Must be in good condition. Send full particulars to

DIXIE LIME PRODUCTS COMPANY
Ocala Florida

WANTED

SALES ENGINEER—experienced in selling crushing and cement machinery. State qualifications and salary expected. Replies will be held in strictest confidence.
Send all replies to

BOX 603
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

No. 19 & No. 37 Kennedy Fine Reduc. Gyr. Crushers.
Kohler and other makes Gas Light Plants 110 V DC.
6, 8, 10, & 12" Sand and Gravel Pumps.
Conveyor Equipment 14 to 36" Belt and Portable.
2—21 Ton 36" Ga. Davenport Saddle Tank Locomotives.
60 to 360 HP Fairbanks-Morse Type Y Style VA Diesels.
2 Yd. Koppel, 4 Yd. Western 36" Ga. Dump cars. Flue.
1½ yd. Page type C Dragline Bucket—Bargain.
Vibrating and Rotary Screens, all types, sizes.
20—1½ yd. 30" ga. Day Evans all-steel Dump Cars.
½ yd. Owen Clamshell. Ask for Bulletin No. 45.

MID-CONTINENT EQUIPMENT CO.
710 Eastgate Pa. 2290 St. Louis, Mo.

WANTED

One yard drag scraper outfit with yard Crescent Scraper.

H. A. HARMS
Blackwater Missouri

WANTED

DRAFTSMAN—experienced in designing crushing and metallurgical machinery. State qualifications and salary expected. Replies will be held in strictest confidence.
Send all replies to

BOX 606
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

Rebuilt Equipment

MARION Model 32 1½ yard Steam Shovel, 27' Boom; 17' Sticks.
McMYLER 35-ton Type J Locomotive Crane; 50' Boom; Air Brakes; Double Drums.
AMERICAN 40 ton 4 Wheel Saddle Tank Type Locomotive.
P&H model 206—¾ yard crane.
BROWNHOIST 40 ton Locomotive crane.
VULCAN 8 ton Std. Ga. gas locomotive.
BALDWIN 58 ton 6 wheel switcher, 12x24" cyl. Walscheart valve gear.
WESTERN 6 yard hand dump cars.
NORDBERG model S track shifters.
KOEHRING Model No. 1—¾ Yd. Dragline.
UNIVERSAL ½ Yd. Truck Crane.
PLYMOUTH 15-ton Std. Ga. Gasoline Locomotive; Air Brakes.
K&J 16 Yd. Air Dump Cars.
HAYWARD ⅓ Yd. Orange Peel Bucket.

Write for Complete List

SOUTHERN IRON & EQUIPMENT COMPANY

Plant & General Offices

Atlanta, Georgia

For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher with RA2P LeRoi Engine.
28' Elevator.
36 x 12' Screen.
30 Ton. 4 compartment Bin.
26' Reject Conveyor (Slightly used, as good as new).
NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.
NEW 11 x 20 Bronze Bearing Jaw Crusher.
NEW 24 x 36 Plain Bearing Jaw Crusher.
NEW 30 x 18 Roller Bearing Double Roll Crusher.
1—USED 5 ton per hour Day Pulverizer.
1—USED 10 to 15 ton per hour Gruendler Pulverizer.
1—NEW 10 to 15 ton per hour Pulverizer.
1—NEW 6 to 7 ton per hour Gruendler Pulverizer.
1—36 x 16' Trunnion type Revolving Screen with Dust Jacket.

CRUSHER SERVICE

Box 975

St. Louis **Missouri**

COMPLETE GRANULE PLANT

4—Allis Chalmers 16x40" and 14x30" **Crushing Rolls.**
1—Farrell 20x10" **Jaw Crusher,** mang. fitted.
1—Symons 24" horizontal **Disk Crusher.**
4—Sturtevant 96"x72" **Newago Screens.**
1—**Conveyor,** 16" belt, 50' centers.
Also Dryers, Gyratory Crushers, Kilns, Ball Mills of all types and sizes. We have what you need!
Send for our new 20 page catalogue. We are interested in your surplus equipment.

BRILL EQUIPMENT CORPORATION
183 VARICK STREET
NEW YORK, N. Y.

1—1500 Ton Butler 5 Compartment Storage Bin.
1—130 bbl. Blaw-Knox Cement Bin.
2—300 bbl. Blaw-Knox Cement Bins.
15—Compressors, 528-2600 cu. ft. cap. Gas, Diesel, Electric. Stationary and Portable.
21—Boilers—20 to 150 H.P. Vertical and Horizontal High Pressure.
60—Hoists 1-2-3 Drum Steam, Gas and Electric.
5—Derricks, Steel Stiff Leg, 10 to 25 tons capacity.
12—Locomotives, 8 to 40 tons—Gas—all **gauges.**
30—Flat Cars—36" gauge.
15—Buckets and Belt Conveyors—All Sizes, Rails and Rail Supplies.

COAST-TO-COAST STEEL & EQUIP. CORP.
9 Rockefeller Plaza
New York **New York**

STANHOPE OFFERS!

AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1302, 1722 & 2850 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 528, 1300 & 2200 Ft.

BUCKETS
¾ Yd. Hayward Class E
1½ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E
CLAMSHELL: ½, ¾, 1, 1½ & 2 Yds.
ORANGE PEEL: ¾, 1, 1½, 2 & 3 Yds.
DRAGLINE: ½, ¾, 1, 1½ & 2 Yds. Cap.

CRANES & DRAGLINES
5 Ton Brawhoist. 30 ft. Boom Gas.
12 Ton NORTHWEST 50 Ft. Boom Gas
12 Ton KOERRING 45 Ft. Boom Gas
16 Ton Speedcrane, Gas, 50 ft. Boom
25 Ton BROWNING & 30 Ton AMERICAN Locomotive
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom

CATERPILLAR SHOVELS
⅜ Yd. BYERS Electric
¾ Yd. KOEHRING Gasoline
¾, 1¼ Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics
1 Yd. NORTHWEST Gas & 7/8B2 Steamer
1½ Yd. BUCYRUS 41B Steamer

DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga., V Shaped
15—2 Yd., 3 Yd. 4 Yd. 30 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

BALL, ROD AND TUBE MILLS
6x8 Continuous Pebble Mill
5x5 Batch Mill
5'x22" HARDINGE CONICAL Dry Ball Mill
3'x36" HARDINGE CONICAL Wet Ball Mill
3'x6" HARDINGE CONICAL Dry Ball Mill
6'x22" HARDINGE CONICAL Pebble Mill
8'x22" HARDINGE CONICAL Ball or Pebble Mill
4x8, 8x6, & 10x9 Straight Ball Mills
4x16, 5x18, & 5x22 Tube Mills
3½x8 & 5x7 Air Swept Tube Mills
2x4½, 3x10 & 5x12 ROD MILLS

PULVERIZERS
JEFFERY 24x20 B & #1½ Sturtevant Ring Roll
RAYMOND Auto. Pulverizer No. 0000, 0 & 3
RAYMOND Imp Mills No. 4, 32 & 55
GRUENDLER 3XB Mill & Jay Bee No. 3 & 4
RAYMOND 4 & 5 ROLL MILLS & 5 Ft. Chaser Mill

SEPARATORS AND COLLECTORS
14 ft., 8 ft. and 12 ft. Separators
Type 360 Sly 8x24, 8x52 and 16x42 Dust Collectors

ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers
24x12 Power & Mng. Smooth Roll

JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36
12x26 Champion, Screen & Elevator

CONE & GYRATORY CRUSHERS
42 in. McCully Mammouth Gyratory
18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory
4—Nos. 5, 3 & 6 Austin Gyratory
2—Traylor T-12 Bulldog Gyratory
8 in. Traylor T. Gyratory. Telsmith No. 9
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½
10 Inch Austin Model 105
10 & 13 Inch Superior McCullus
KENNEDY: Nos. 19, 27, 39 & 49

HAMMER MILLS
Pennsylvania Trojan M-1.
4 Jeffreys: 24x18-A, 36x24-B, 42x36-E & 42x48-B.
Williams No. 1 Jumbo Jr., & No. 6 Universal.
Gruendler No. 8 X.
Dixie Mogul No. 5040.

HOISTING ENGINES
7 Gasoline 15, 40, 60 & 100 H.P.
17 Steam 7x10, 8½x10 and 10x12
8 Electric 20, 35, 50, 60, 100 & 150 H.P.

DRILLS
4—SANDERSONS 14 & LOOMIS 44
7—Ingersoll-Rand Wagon Drills

STEEL BINS
72 Ton BLAW-KNOX 2 Compt.; also 250 ton
100 Ton BLAW-KNOX 2 Compt.

CEMENT BIN
400 BBl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher

BUCKET ELEVATORS
7 Steel Encased Chain & Belt Elevators: 15 In. by 60 ft., 24 In. by 63 ft. 18 In. by 48 ft., 12 In. by 30 ft.
ELEVATOR BELT: 600 Ft., 30 In.—1326 Ft. 20 In. & 18 In.

RUBBER HOSE
Air: ¼ in. to 1½ in. Water: ¾ in. to 10 in.

CONVEYOR PARTS
BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 317 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 8 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft.

STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom

LOCOMOTIVES
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton

SCREENS
VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72. HUMMER, ROTEX, NIAGARA & ROBINS
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16, 4x20, 4x23, 4x24, 5x30, 5x20, 6x20

SAND WASHERS AND CLASSIFIERS
4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft. TELSMITH 13 Ft. by 2 Ft. 8 In. Screw Washer.

RAILROAD CARS
12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

SAUERMAN DRAG AND SLACKLINES
1—¾ yd. Gas 1—1½ yd. Electric
1—1 yd. Electric 3—2 yd., 3 yd. & 4 yd. Electric

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
575 6TH AVENUE, NEW YORK, N. Y.
Pennsylvania 6-3565 or 6-3566

RECONDITIONED CONTRACTOR'S EQUIPMENT

DOUBLE DRUM HOISTS
ELECTRIC
2—Lidgerwood with swingers & 80 H.P. G.E. motors, $1100.00 each
2—Lambert with 60 H.P. G.E. motors, $700.00 each

AIR COMPRESSORS
1—Sullivan two stage angle compounds 400' on skids, electric driven $1500.00

GASOLINE DRIVEN PORTABLES
3—Sullivan 310' displacement, $650.00 each
2—Sullivan 220' displacement, $700.00 each
3—Sullivan 160' displacement, $550.00 each
15—Sullivan Model K-10, 75 lb. concrete breakers, $100.00 each

SELF PRIMING CENTRIFUGAL PUMPS
GASOLINE DRIVEN
2—6" Domestic, $350.00 each
2—6" Sterling, $400.00 each
2—4" Sterling, $200.00 each
2—4" Domestic, $150.00 each
3—3" Rex, $100.00 each

MISCELLANEOUS EQUIPMENT
2—20 ton American Terry #3 Guy Derricks, 90' boom, 80' mast, complete with guys and fittings, $1500.00 each
1—288 Jaeger end discharge on four steel wheels, gasoline driven, with batch skip, power operated discharge chute and water tank. $1250.00
1—Gasoline driven Portable 24" belt conveyor, 60' long, $700.00
1—288 Koehring with batch hopper, water tank on skids, electric, $750.00
1—218 Ransome with batch hopper, water tank on skids, electric, $700.00

UNITED HOISTING CO., INC.
Serving the Construction Industry for 47 years
175 Locust Avenue, New York, N. Y.
Melrose 5-2100

LOCOMOTIVES

100 Ton American 2-8-0 separate tender, 23x28" cylinders.
80 Ton Baldwin 8-wheel switcher 0-8-0 separate tender, 21x28" cylinders.
82 Ton American 6-wheel switcher, 0-6-0 separate tender, 21x28" cylinders.
75 Ton Baldwin 6-wheel switcher, 0-6-0 separate tender, 21x26" cylinders.
72 Ton Baldwin 6-wheel switcher 0-6-0 separate tender, 20x26" cylinders.
60 Ton Baldwin 6-wheel switcher 0-6-0 separate tender, 19x26" cylinders.
50 Ton Baldwin 6-wheel switcher 0-6-0 separate tender, 17x24" cylinders.

Complete Stock List on Request

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham **Alabama**

AIR COMPRESSORS

1721' I-R, type PRE-2, Dir. Con. Syn. Mt., 100#
1500' I-R, type XB-2, Belted Ind. Motor, 100#
1302' I-R, type PRE-2, Dir. Con. Syn. Mt., 100#
1052' I-R, type XCB, Belted Syn. Motor, 100#

SYNCH. MOTOR GENERATORS

500 KW G.E., 250 V., 2300/4000 A.C., 900 RPM
300 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
300 KW G.E., 125/250 V., 2300/4000 A.C., 900 RPM
300 KW G.E., 250 V., 2300/4000 A.C., 720 RPM
250 KW G.E., 250 V., 240/480 A.C., 720 RPM
200 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM
150 KW WEST., 250 V., 2300/4000 A.C., 1200 RPM
100 KW G.E., 250 V., 2300 A.C., 1200 RPM

Synchronous Converters

300 KW G.E., 250 D.C., 2300/4000 A.C., 1200 RPM
200 KW G.E., 250 D.C., 2300/4000 A.C., 1200 RPM
200 KW R.W., 250 D.C., 2300/4000 A.C., 1200 RPM
150 KW R.W., 250 D.C., 2300/4000 A.C., 1200 RPM

(Each unit listed above is owned by us and is only a small part of our large stock, including Battery & Trolley Locomotives, Transformers, Motors, Coal Crushers & Wheel Presses.)

WALLACE E. KIRK COMPANY

Incorporated
502-E Grant Building Pittsburgh, Pa.

Owen Buckets
A MOUTHFUL AT EVERY BITE
helped to build
the SAN FRANCISCO BAY BRIDGE •
the GOLDEN GATE BRIDGE •
and TREASURE ISLAND •
THE OWEN BUCKET COMPANY
6050 Breakwater Avenue Cleveland, Ohio
Branches: NEW YORK, PHILADELPHIA,
CHICAGO, BERKELEY, CAL.

Index to Advertisers

Alloy Steel & Metals Co 89
*American Cable Div. of American Chain & Cable Co., Inc. Inside Back Cover
*American Chain & Cable Co., Inc. Inside Back Cover
*American Pulverizer Co 87
Anchor Concrete Machy. Co 72
Atlantic Equipment Corp 93
Audubon Wire Cloth Corp 90

*Barber-Greene Co 2
Bacon, Inc., Earl C 65
*Bay City Shovels, Inc 89
Best Engineering Co., Inc., W. N. .. 63
Birmingham Rail & Locomotive Co. 95
*Blaw-Knox 79
Blue Ball Machine Works 91
Broadcast Section 91-96
*Brooks Equip. & Mfg. Co 87
*Bucyrus-Erie Co 4
*Bucyrus-Monighan Co 4
Buell Engineering Co., Inc 18

Carborundum Company, The 3
Chicago Perforating Co 62
Chicago Steel Fdry. Co 82
Cincinnati Rubber Mfg. Co 60
Cleveland Wire Cloth & Mfg. Co ... 81
Commercial Shearing & Stamping Co., The 77
Consolidated Products Co 92
Crusher Service 95
F. D. Cummer & Son Co., The 77

*Deister Concentrator Co 64
Deister Machine Co 82
*Dempster Bros 88
Dunn Mfg. Co., W. E 78

*Eagle Iron Works 13
*Ensign-Bickford Co 10
Equipment Corporation of America 93
*Erie Steel Constr. Co 75

Flexible Steel Lacing Co 87
*Fuller Co 90

Gates Rubber Co., The 5
*General Electric 61
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp 9
Goodyear Tire & Rubber Co., The Inside Front Cover

*Haiss Mfg. Co., Geo 63
Heltzel Steel Form & Iron Co 76
*Hendrick Mfg. Co 90
Hetherington & Berner, Inc 96
Hoffman Bros. Drilling Co 94
Hotel Fort Wayne 89
Hyman-Michaels Co 92

Industrial Brownhoist Corp 81

*Jaeger Machine Co 77
*Jeffrey Mfg. Co 58

Kansas City Hay Press Co 91
*Kent Machine Co., The 69
Kirk Co., Wallace E 95
*Koehring Company 15

Lewis, Harry C 91
Lewistown Foundry & Machine Co. 76
*Link-Belt Co 1
Ludlow-Saylor Wire Co 88

Manganese Steel Forge Co 90
Marietta Concrete Corp 79
Marmon-Herrington Co., Inc 57
McCarter Iron Works Inc., The 79
*McLanahan & Stone Corp 90
McLeod, Alex T 91
Merrick Scale Mfg. Co 91
*Morris Machine Works 83
*Multiplex Concrete Machy. Co 76

National Powder Co 66
*National Wire Cloth, Inc 91
Naylor Pipe Co 66
New Holland Machine Co 60
*Nordberg Mfg. Co 91

Owen Bucket Co 96

*Parson Engineering Corp 59
Pennsylvania Drilling Co 94

Quinn Wire & Iron Works 76

*Raymond Pulverizer Div. of Combustion Engr. Co., Inc 16
Republic Rubber Division of Lee Rubber & Tire Corp 11
*Robins Conveying Belt Co 89
*Roebling's Sons Co., John A 6-7
Rogers Iron Works Co 64

*Sauerman Bros., Inc 87
Screen Equipment Co 66
*Smidth & Co., F. L 90
Smith Engineering Works .. Back Cover
*T. L. Smith Co., The 78
Southern Iron & Equipment Co 95
Sprout, Waldron & Co 90
Stanhope, Inc., R. C 95
Straub Mfg. Co 85
Strong Scott Mfg. Co., The 91

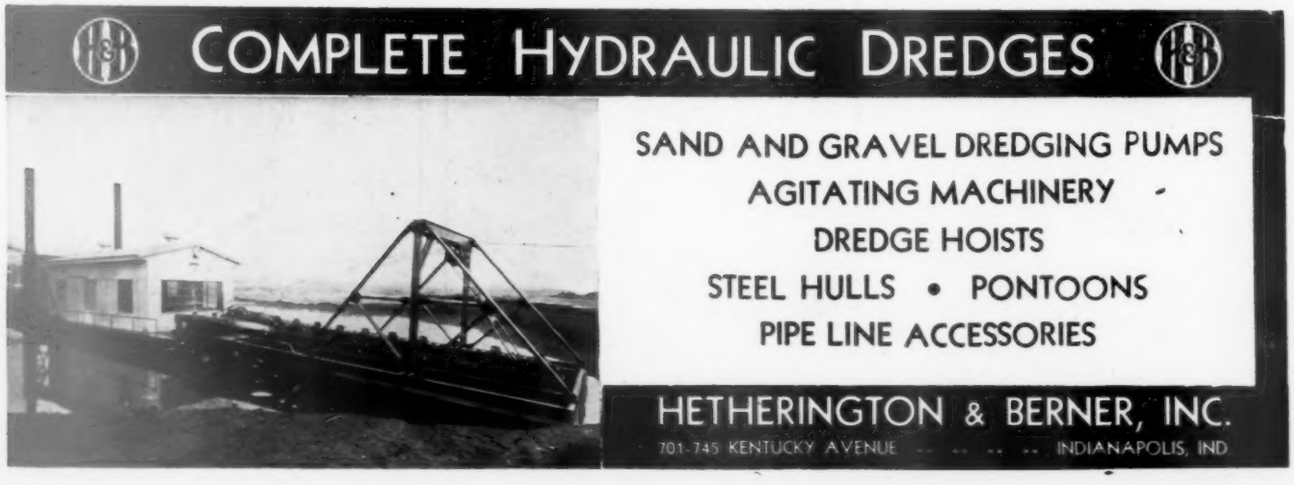
Taylor Forge & Pipe Works 65
Timken Roller Bearing Co., The ... 8
*Traylor Engineering & Mfg. Co 81
*Tyler Co., W. S 62

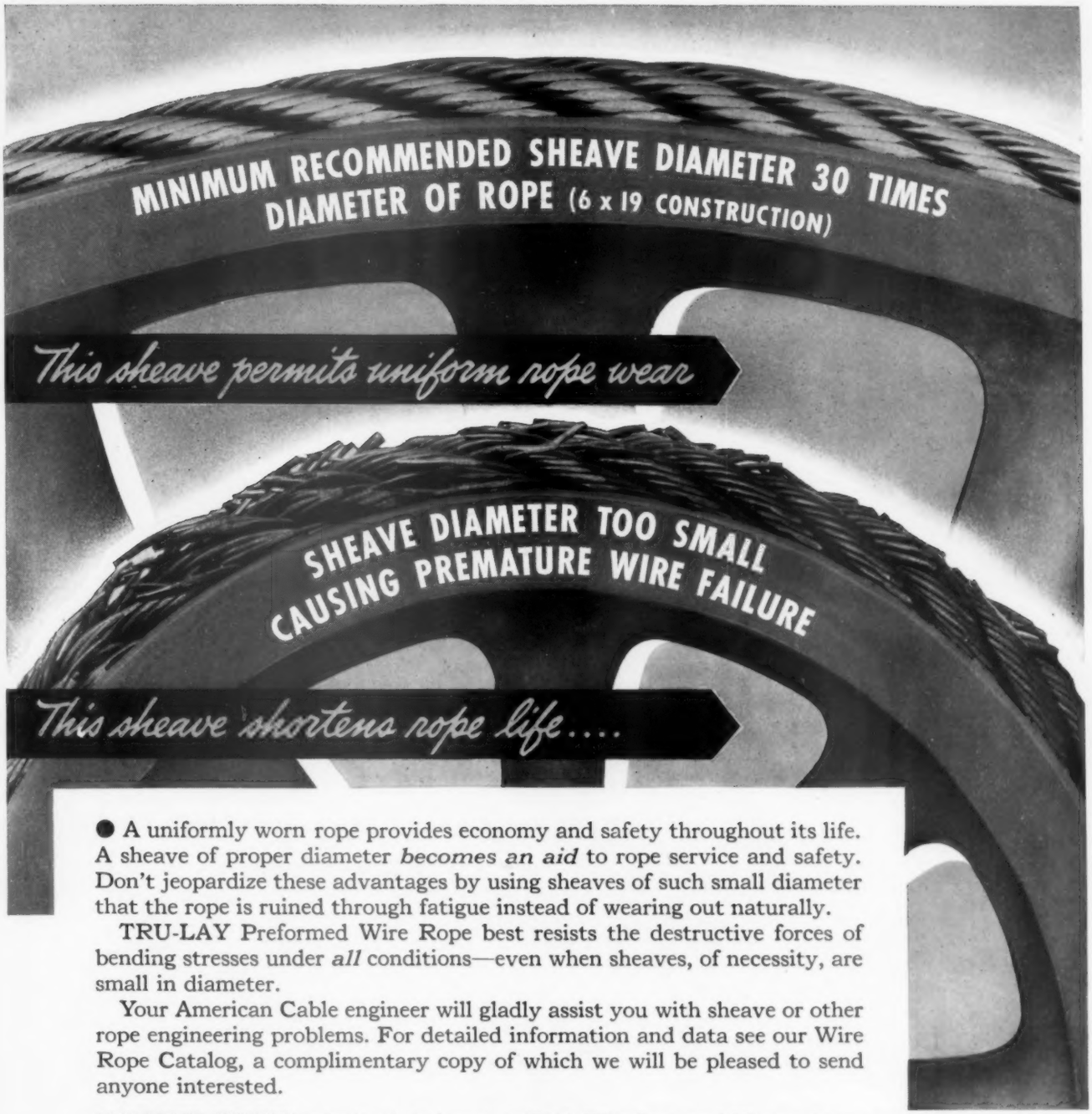
United Hoisting Co., Inc 95
*Universal Concrete Pipe Co 72
Unverzagt, G. A 93

Walsh Co., R. P 93
*Warren Bros. Roads Co 76
Wellman Engineering Co., The 85
*Williams Patent Crusher & Pulverizer Co 90

Zagelmeyer Cast Stone Block Machy. Co 76

***See also Information in the 1939 Pit and Quarry HANDBOOK**




MINIMUM RECOMMENDED SHEAVE DIAMETER 30 TIMES DIAMETER OF ROPE (6 x 19 CONSTRUCTION)
This sheave permits uniform rope wear
SHEAVE DIAMETER TOO SMALL CAUSING PREMATURE WIRE FAILURE
This sheave shortens rope life....

● A uniformly worn rope provides economy and safety throughout its life. A sheave of proper diameter *becomes an aid* to rope service and safety. Don't jeopardize these advantages by using sheaves of such small diameter that the rope is ruined through fatigue instead of wearing out naturally.

TRU-LAY Preformed Wire Rope best resists the destructive forces of bending stresses under *all* conditions—even when sheaves, of necessity, are small in diameter.

Your American Cable engineer will gladly assist you with sheave or other rope engineering problems. For detailed information and data see our Wire Rope Catalog, a complimentary copy of which we will be pleased to send anyone interested.

BUY ACCO QUALITY *whether it is American Cable Wire Rope and Slings—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Ford Chain Blocks—Page Chain Link Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

See our exhibit, Metals Building, New York World's Fair

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA
District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

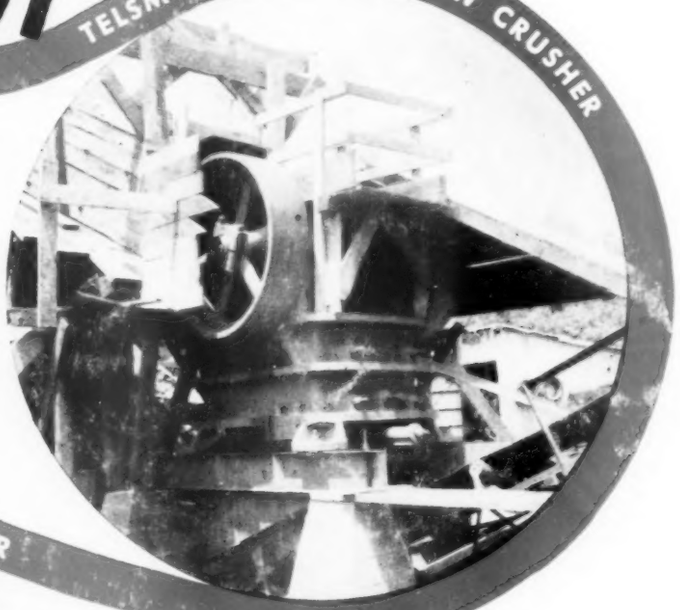
GREEN SIGNIFIES SAFETY

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*

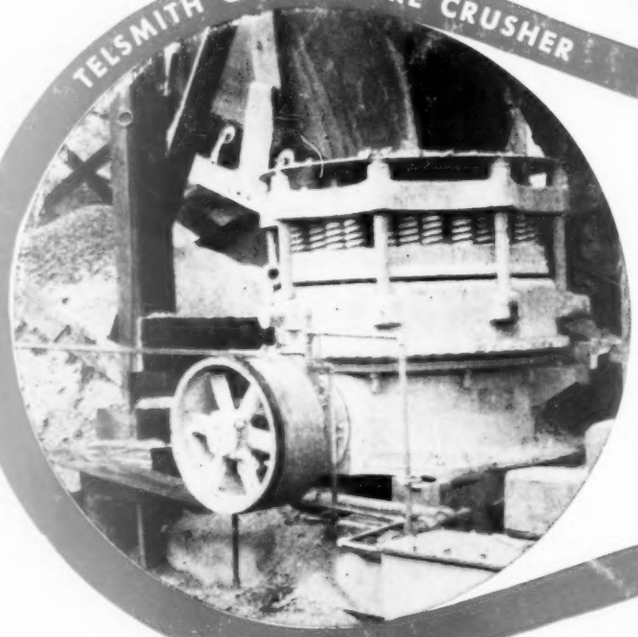
EXTRA OUTPUT

TELSMITH-WHEELING JAW CRUSHER



The most modern type of jaw crusher . . . for coarse or intermediate crushing . . . the Telsmith-Wheeling is equipped throughout with *cylindrical roller bearings*. This crusher delivers more crushing strokes per minute . . . almost double capacity . . . and greater reduction in one process than with any other type of breaker. All internal frictional wear is taken on the bearing races . . . no wear on shaft. Up-keep is reduced . . . service life prolonged. 7 sizes. *Write* for Bulletin W-15.

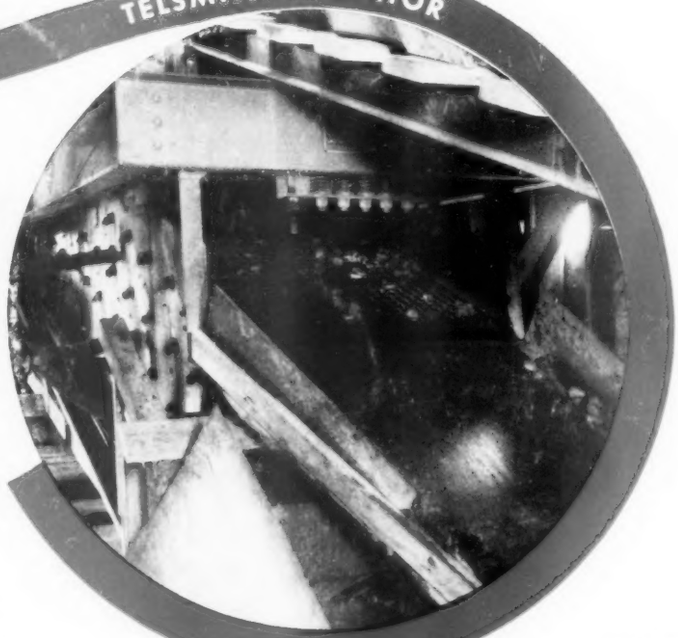
TELSMITH GYRASPHERE CRUSHER



EXTRA PROFITS

For secondary crushing, the Telsmith Gyrasphere takes an unlimited choke feed . . . crushes finer with fewer over-size slabs and splinters . . . costs less for power and upkeep. With its spherical crushing head, impelled by both the gyrated shaft and the rotary wedge action of the supporting eccentric, its crushing action is the most effective ever devised. *Write* for Bulletin Y-15.

TELSMITH PULSATOR



LOWER UP-KEEP

Sand, gravel, crushed rock, ore, coal—Telsmith Pulsator *screens 'em all*, wet or dry, and does it *right*. Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire, regardless of load. Telsmith builds in greater value, longer life and lower up-keep with the toughest alloy steels, anti-friction bearings, and special seal protection for working parts. 11 sizes . . . 1, 2, 3 and 4 decks. *Write* for Bulletin V-15.

SMITH ENGINEERING WORKS
504 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN
Cable Addresses: Sengworks, Milwaukee. Concrete, London

50 Church Street New York City	211 W. Wacker Drive Chicago, Ill.	713 Commercial Trust Building Philadelphia, Pa.
81 Binney Street Cambridge, Mass.	412 Westinghouse Bldg. Pittsburgh, Pa.	Brandeis M. & S. Co. Louisville, Ky.

MC 10-A-39

TELSMITH